Document of
The World Bank

Report No: 24702

IMPLEMENTATION COMPLETION REPORT
(CPL-38280)

ON A

LOAN

IN THE AMOUNT OF US$100 MILLION

TO THE

REPUBLIC OF KOREA

FOR A

PUSAN URBAN TRANSPORT MANAGEMENT PROJECT

February 7, 2003

Transport Sector Unit
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective January 23, 2003)

Currency Unit = Won
Won 1.00 = US$ 0.00081
US$ 1.00 = W1,212

FISCAL YEAR
January 1 December 31

ABBREVIATIONS AND ACRONYMS

ADT	=	Average Daily Traffic
CAS	=	Country Assistance Strategy
CBD	=	Central Business District
EIA	=	Environmental Impact Assessment
EIRR	=	Economic Internal Rate of Return
EPB	=	Economic Planning Board
IBRD	=	International Bank for Reconstruction and Development
ICR	=	Implementation Completion Report
KOTI	=	Korea Transport Institute
LCB	=	Local Competitive Bidding
MOC	=	Ministry of Construction
MOE	=	Ministry of Environment
MOF	=	Ministry of Finance
MOT	=	Ministry of Transportation
MRT	=	Mass Rapid Transit
MT	=	Metric Ton
OSROK	=	Office of Supplies, Republic of Korea
PCG	=	Pusan/Busan City Governmnent
PCR	=	Project Completion Report
PT	=	Public Transport
PUTA	=	Pusan/Busan Urban Transit Authority
SAR	=	Staff Appraisal Report
SOE	=	Statements of Expenditure
TDM	=	Transport Demand Management
TSM	=	Transportation System Management

Vice President:	Jemal-ud-din Kassum
Country Manager/Director:	Haneen Ismail Sayed
Sector Manager/Director:	Jitendra N. Bajpai
Task Team Leader/Task Manager:	Kavita Sethi

REPUBLIC OF KOREA
PUSAN URBAN TRANSPORT MANAGEMENT PROJECT

CONTENTS

Project ID: P004175	*Project Name.* KR-Pusan Urban Transport
Team Leader: Kavita Sethi	*TL Unit.* TUDTR
ICR Type: Core ICR	*Report Date: March 12, 2003*

1. Project Data

Name KR-Pusan Urban Transport
L/C/TF Number: CPL-38280
Country/Department: REPUBLIC OF KOREA
Region East Asia and Pacific Region
Sector/subsector: General transportation sector (90%); Sub-national government administration (9%); Central government administration (1%)

KEY DATES

			Original	*Revised/Actual*
PCD:	07/14/1992	*Effective:*	06/01/1995	10/27/1995
Appraisal:	04/29/1994	*MTR*		
Approval.	12/20/1994	*Closing*	06/30/2000	06/30/2002

Borrower/Implementing Agency: Republic of Korea/Pusan City Government and Pusan Urban Transit Authority
Other Partners. Ministry of Transportation

STAFF	Current	At Appraisal
Vice President.	Jemal-ud-din Kassum	Russell Cheetham
Country Manager:	Haneen Ismail Sayed	Calisto Madavo
Sector Manager:	Jitendra N. Bajpai	Khalid Ikram
Team Leader at ICR.	Kavita Sethi	Jitendra N. Bajpai
ICR Primary Author:	Kavita Sethi; Han-Kang Yen; Alberto Nogales	

2. Principal Performance Ratings

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HL=Highly Likely, L=Likely, UN=Unlikely, HUN=Highly Unlikely, HU=Highly Unsatisfactory, H=High, SU=Substantial, M=Modest, N=Negligible)

Outcome: S
Sustainability. L
Institutional Development Impact. SU
Bank Performance: S
Borrower Performance: S

	QAG (if available)	ICR
Quality at Entry:		S
Project at Risk at Any Time	No	

3. Assessment of Development Objective and Design, and of Quality at Entry

3.1 Original Objective:
The project's overall objective was to promote the effectiveness of an urban rail transit system in Pusan City, through demand management measures and modal integration and policy reforms in areas of public parking and transit pricing. The specific goals identified in the SAR were to (a) increase ridership and cost recovery of the subway network through an integrated strategy that includes transport demand management (TDM), construction of intermodal facilities, and expansion of the transit system; (b) enhance PUTA's subway capacity so it could accommodate future growth and serve as an alternative to auto use; and (c) strengthen the capacity of existing institutions to plan and program urban transport investments.

The objectives of the project were clear and supported the Government's priorities of the time. In the early 1990's Korea's industrialization, improved living standards and rapid population growth were accompanied by rapid increases in nearly all types of transportation. The city's total passenger traffic was projected to grow at 5% per annum between 1993 and 2001, with the biggest increases anticipated in subway and suburban rail traffic at about 15% per year. The Government's National Transport Action Plan, 1993, provided for capacity expansion and traffic system management (TSM) strategies for urban areas. Capacity expansion was planned for roads, rail, airports, and subway systems. New subways were planned for four cities with populations greater than a million, with new lines to be added to the existing systems in Seoul and Pusan. The project took an integrated approach to these issues, through the use of demand management and improvements in supply directed towards encouraging and facilitating use of the subway and improving the efficiency of the urban transportation system.

As discussed in the text, the viability of the program depended upon two key assumptions: (i) the proposed demand management interventions would influence behavior in desired ways; and (ii) ridership growth would continue in accordance with past trends. In retrospect, largely due to external factors, neither expectation came true to the extent anticipated.

3.2 Revised Objective:
The original project objectives were not revised.

3.3 Original Components:
The project included three components, at an estimated project cost of US$365.4 million (including contingencies and taxes). The base cost was estimated at US$286.7 million; physical and price contingencies at US$45.7 million, and taxes at US$32.9 million (for details of actuals and estimates, see Annex 2). The individual components are briefly described below:

Component A - Congestion Management (US$ 52.93 million). Introduction of a system to manage vehicle traffic and encourage the use of subway and bus transport; this was intended to be the first step in the development of a comprehensive congestion management program for Pusan. The component included the following:

(i) Transport Demand Management - Modal Integration Facilities at Nopo and Tongnae included the construction of parking areas, bus turnarounds and passenger pick up facilities (US$ 27.98 million).
(ii) Transportation Systems Management strategies to be implemented along the East-West Bus Lane to improve bus speeds, particularly during the peak traffic periods (US$ 2.18 million).
(iii) 5 year Transport Demand Management/Transportation Systems Management program to develop a comprehensive policy and action plan for improved traffic management (US$ 22.8 million).

Component B - Expansion of Pusan Urban Transit System Capacity (US$ 309 million). Purchase of subway cars to supplement trains on Line 1, and cars for trains on Line 2 which was planned to open in 1996. PUTA's capacity expansion plan called for an additional 310 subway cars, of which 258 cars (43 trains of 6-cars each) were for Line 2 (Phase I), and 52 for trains on Line 1. The latter 52 cars were intended to reduce peak period overcrowding on Line 1 by increasing the length of 26 existing trains from 6 to 8 cars each. In 1994, during peak periods, over 230 passengers occupied the space of an average rail car, which was designed to hold 125.

Component C - Institutional Development (US$ 3.42 million). Improvement in staff expertise in urban transport investment planning/programming at the national and local levels through short and long-term training courses, workshops, manuals and overseas training programs. It was agreed that the training and education program would be financed by MOT, while the project financed the following studies: (i) Pusan Transit Fare Structure Study; (ii) 5-year TDM/TSM Program Study; and (iii) a Study to identify Alternative Long-term Financing Strategies for PUTA. Technical assistance (TA) consisting of one or two professionals to advise the Pusan City Government on the implementation of TDM and TSM measures was also included. The three sub-components had budgets as follows:

(i) Training (US$ 1.8 million)
(ii) Studies (US$ 1.5 million)
(iii) Technical Assistance (US$ 0.12 million)

3.4 Revised Components

The project components were not revised. During project implementation the following Borrower requests were approved by IBRD.

(i) The original closing date was extended on April 16, 1999, by one year, from June 30, 2000 to June 30, 2001; a second one year extension was approved on April 4, 2001, primarily to accommodate the delivery of the last batch of subway cars.
(ii) The Loan Agreement was amended on March 22, 1999, to allow purchase of subway cars for Phase II of Line 2 with the savings generated by the fluctuation of the exchange rate. The original agreement included train cars for only Phase I, Line 2.
(iii) In October 2001, the Borrower requested cancellation of the unwithdrawn amount of US$7,931,005.09; the request was approved and the loan and commitment charges for this amount ceased to accrue from November 2, 2001.

3.5 Quality at Entry:

The project was well prepared, and quality at entry is rated satisfactory -- in addition to the SAR, a comprehensive report on the Korean transport sector was completed and provided a rich background for the project itself. Overall, the project was in line with the Bank's Country Assistance Strategy, as articulated in the Financial Intermediation Project (Loan 3689-KO); the key elements with a bearing on the development objectives were identified during the preparation process and lessons from previous Bank projects in the urban transport sector in Korea were incorporated.

At the time the project was being prepared, Korea had passed the income threshold for graduation from the Bank, a graduation process had been agreed with the Government and was underway. The Bank's strategy was to continue lending until graduation in areas where Bank involvement would provide value added, e.g., through sectoral policy advice or institutional strengthening, in addition to the resource transfer itself. Urban transport was deemed one such area, as demand for urban infrastructure services was growing rapidly due to rising incomes and consumption. The Pusan Urban Transport Project was designed as part of a comprehensive metropolitan area program to reduce traffic congestion and air pollution from vehicles, while improving coordination among different modes of transport.

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

Overall, the project outcome is Satisfactory. The project has succeeded in its overall objective to promote the effectiveness of an urban rail transit system in Pusan City, through demand management measures, modal integration, and policy reforms in the areas of public parking and transit pricing. Due to efforts by PCG and PUTA, both within and transcending the framework of this project the quality of passenger services has been maintained or improved, and the overall capacity of the subway network to meet current and future travel demand has been increased. The objective of improvements in PUTA's operational cost recovery was adversely affected by the Asian financial crisis, 1997-98, compounded by a slowdown in population growth and decline in densities due to urban sprawl. The achievement of the specific objectives of the Project is presented below.

A. Expansion of Pusan Urban Transit System Capacity

The progress towards this objective has been satisfactory. PUTA has significantly expanded the subway network and increased its service capacity while maintaining a very good track record in terms of safety. 336 rail cars have been purchased, delivered, and are in use on Line 2 of the metro system. The number of cars purchased under the project is higher than the originally planned 310; the increase in cars bought was made possible by the devaluation of the Won during the Asian crisis. The overall increase in capacity on Phase 1, Line 2, is thus higher than what was planned under the project. The number of cars in service on Line 1 has also increased as PUTA used its own funds, which would otherwise have been directed to funding cars for Line 2, to procure 60 cars for Line 1. These have been used to increase the length of trains on Line 1 from 6 to 8 cars each.

At the same time that service capacity on Line 1 and Phase 1, Line 2, has been increased, the size of the subway network has also been substantially increased, though the Bank did not participate in the financing of the civil works for network expansion. With the completion and opening of Lines 2 and 3, the subway network will have more than tripled in length from the original network of Line 1 (32 km) to a network of more than 100 kms in length, with 5 transfer stations and more than 100 stations at an investment cost of 6,000 billion Won or about USD 6 billion equivalent. (See Section 4.2, Outputs by Component, and Section 5.4, Costs and Financing).

While system capacity has been successfully expanded, the subsidiary goal of influencing modal shares in favor of mass transit has been less successful. The share of cars in total trips (all modes) has increased from approximately 17% in 1991 to about 30% in 2001. At the same time, metro ridership has not expanded as rapidly (see table 1). Following a period of passenger growth at the rate of 12% per annum between 1988 and 1993, the average annual growth in ridership declined to 3.6 % between 1994 and 2001. Consequently, between 1991 and 2001, the share of metro in total trips (all modes) increased to about 12% as compared to a share of 22.5 % forecast at appraisal. As the latter number includes ridership for Line 2 and Line 2 only became fully operational towards the end of 2002, there is room for an increase in metro's modal share as Line 2 ridership matures.

These numbers reflect the shift in Busan's traffic mix since the time of appraisal – automobiles have assumed greater significance than before. In Busan, a steady rise in income and living standards, demographic and industrial land use changes, and the development of Korea's car manufacturing industry were all factors influencing the ownership and use of cars (see section 5.1). Compared with 1991 car ownership has increased from 76 vehicles per thousand population to 141 per thousand in 2001. This

despite the growing vehicle ownership restraint measures, including a certificate system that proves the availability of a garage for each new car buyer, and the obligation to purchase subway bonds while purchasing a vehicle, to curb growth in motorization.

In the past, urban transport prices in Korea have been regulated by the central government in the interest of inflation control. More recently the authority to set tariffs has been decentralized to local governments -- responsibility for bus and taxi fares was decentralized in January 2000 while subway fares setting authority was transferred in April 1999. Since decentralization, subway fares have been increased but remain below full cost. Direct costs for private vehicles also do not reflect full costs to society, despite recent increases in fuel prices. For example, the cost of a 10 km trip by car is estimated to be over 600 Won. A metro ticket for travel over the same distance costs 600 Won; any marginal cost advantage the metro has, is not sufficient to overcome the greater convenience and comfort of travel by car. The regulated prices tend to stimulate transport demand and distort modal choices. In general, usage costs tend to favor private cars over public transport and even buses have been losing their share of total trips though they are the dominant public transport mode in Busan. In fact, the share of all public transport (bus, taxi, MRT) in passenger movement has declined from about 80% in 1991 to approximately 68 % in 2001.

Table 1: Modal Share (Actual versus Forecast)

Modal share (%)	1991 (actual)	1997 (forecast)	2001 (forecast)	2001 (actual) (1)
Cars	16.8	18.6	17.9	30
Taxi	19.9	21.3	16.7	14
Bus	51.3	43.7	40.7	42
Subway	8.8	13 4	22 5	12
Others	3.2	3.2	2.7	2

Source: SAR Annex 15
(1) Estimates from different sources

B. Increase in Cost Recovery

Increasing cost recovery was one of the development objectives of the project cited in the SAR, and it was incorporated as an operating ratio covenant in the Loan Agreement. The target, starting in 1996, was to maintain an operating ratio of 100; i.e., PUTA's total revenues from passenger fares and advertising should be at least equal to total operating costs (includes working costs, depreciation of rolling stock and equipment plus a replacement reserve).

Table 2: Trends in PUTA's Cost Recovery

	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
(a) Recovery of working costs & depreciation (rolling stock +equipment) (%)	77 7	77 9	77.1	89.4	69.3	52.8	63.4	67.3	67 7
(b) Target for (a) (%)			100	100	100	100	100	100	100
(c) Recovery of working costs & depreciation (rolling stock only) (%)	100.5	98.8	94.9	100.1	83.6	73 5	84.4	87.6	88 9

It is seen from Table 2 that the objective of full cost recovery was not achieved. During implementation, the Bank focused on recovery of operating costs (working costs plus rolling stock and equipment depreciation). On this measure, PUTA did better; between 1994 and 1997, PUTA was within a few percentage points of the target and in 1994 and 1997 did meet the target of 100% cost recovery. The increase in depreciation associated with the start of operations on Line 2 was a main factor in the failure to meet the target in 1999.

The intention was to maintain and improve PUTA's excellent operational performance and strengthen its ability to service existing and future debt. The improvement in operating cost recovery was to be accomplished through a combination of fare increases in step with inflation and increased ridership.

The history of fare increases, shown in Table 3, Annex 3, is of interest. There were four fare increases in the period 1994-2001, representing cumulatively a real increase of about 44% in the base fare and about 27% in the average fare paid. In the early part of the project, up to 1998, real fares were maintained at the 1995 level. Subsequently, fare increases exceeded the general inflation level by a substantial margin. For example, a base fare increase of 11% was approved in 1999 and another one of 20% in 2000, while the inflation rate was less than 1% in 1999 and 2.25% in 2000. Between 1999 and 2001, average fares increased by approximately 35%. This was partially offset by a loss of traffic, so that the real increase in business revenue from Line 1 was roughly 30% over this period.

Slow ridership growth rates have been one of the factors in PUTA's failure to meet cost recovery targets. The growth rate of metro usage has been impacted by the following factors: delays in completion of Line 2, the 1997-98 Asian Crisis, inadequate integration of service with buses and other vehicles, suburbanization and motorization trends.

Table 3: PUTA Ridership Trend - Actual vs. Forecast

Ridership/year	1994	1995	1996	1997	1998	1999	2000	2001	2002
Actual ('000)	195,640	213,799	218,347	218,307	203,430	224,254	240,920	250,238	224,628 (Jan-Oct)
Line 1						205,000	201,000	198,665	162,072
Line 2						18,600 (phase I· Jun-Dec)	40,000 (phase I)	51,572 (phase I)	62,556 (phase I)
SAR Forecast ('000)	208,737	230,222	232,768	241,389	335,421 (w/line 2, phase I)	441,471 (w/line 2, phase I)	446,383 (w/line 2, phase I)	528,912 (w/line 2, phase I and II)	600,285 (w/line 2, phase I and II)

Line 1 and 2: Aide Memoire April 22, 2002
Discrepancies in Row 2 and the sum of rows 3 and 4 are due to rounding of numbers.

Table 3b: PUTA Ridership Trend - Actual vs. Forecast
(adjusted for delays in completion of Line 2)

Ridership/year	1997	2000 (year 1, Line 2, phase I)	2001 (year 2, Line 2, phase I)
Actual ('000)	218,307	240,920	250,238
Line 1	218,307	201,000	198,665
Line 2		40,000 (phase I)	51,573 (phase I)
SAR Forecast ('000)	241,389	335,421 (w/line 2, phase I)	441,471 (w/line 2, phase I)

In reviewing ridership trends it is necessary to take into account the country's economic situation during the project period. In 1997, Korea suffered a financial crisis accompanied by a rapid depreciation of its currency. The GDP growth rate fell from 5.5% in 1997 to -5.8% in 1998; unemployment increased from less than 2.5 percent of the workforce before the crisis to 8.7 percent in 1999. The consequences of the economic decline were felt in PUTA's ridership – passenger demand on Line 1 actually declined in 1998 with a marginal recovery in 1999. Passenger and advertising revenues fell by about 10% between 1997-98 while working costs were driven up by the depreciation of the Won. The costs of materials and supplies alone increased at an average annual rate of more than 26% between 1994 and 2001. Korea's labor laws did not allow reduction in skilled labor costs while need for professional staff pushed up labor costs with the opening of Line 2. PUTA's management plans not to hire additional staff for the operation of Line 3. This is expected to lower unit operating costs and improve PUTA's financial position in the coming years.

The project supported pilot TDM/TSM measures for better bus-subway integration and improvement of subway utilization. These included, inter alia, introduction of a bus priority scheme on the East-West highway linked to the Tongnae facility, urban bus turn arounds, bus, taxi, and car pick up facilities, and construction of park and ride facilities at Nopodong and Tongnae stations. The pilots have been fully successful in creating convenient transfer possibilities between the subway and road based vehicles. While some of the physical deficiencies in improving bus-subway network connections have been addressed, some major changes have either been recently completed or are outstanding: the inter-city bus terminal was re-located from the CBD to the Nopo station area as recently as September 2001 while the highway connection to the Nopo metro station is still to be constructed. Both of these are expected to increase the accessibility of the metro at Nopo station and facilitate metro usage.

Feeder bus services, for suburban commuters, to the metro are inadequate and available at few subway stations. PUTA attempted to remedy this by offering connecting services by mini buses in residential areas, but faced strong opposition from private operators. Bus operators continue to oppose route restructuring and perceive themselves as competing with, rather than complementing, the subway. Operators claim to have lost ridership with the opening of Line 2: at least 6 bus routes were closed in 1999-2000 and 12 shortened with the opening of Line 2. Inadequate bus-MRT service and fare integration continues to be a major obstacle in improving metro patronage levels. Since the bus system is run privately and the subway is publicly owned, bus-metro integration is taking longer to coordinate and implement. It has been a major contribution of the project to promote recognition by the City, PUTA, and private bus operators of the need for inter-modal integration. Up to now the city has introduced a fare card, the Hanaro fare card, which can be used for both the bus and metro systems. Working with the MoF and MoTC, the City is getting ready to implement revenue sharing arrangements with the bus sector which would allow introduction of an integrated bus-metro fare system. Once implemented, these would go a long way towards integrating and

improving the efficiency of public transport.

Suburbanization and motorization trends in Busan, discussed in Section 4.1 A above, have not favored the use of the subway. Subway usage has been affected by population movements driven by the financial crisis and real estate developments in the Busan metropolitan area. Most strikingly, overall population within Busan actually declined by 2% from 1991-2001. The decline in major industries such as shoe manufacturing and re-location of others, including Dongguk Steel and Cheil Sugar, to the suburbs, affected the growth and location of Busan's population (see section 5.1). Low income populations living along Line 1 have been re-locating to Gupo and Hwamyung, along the west corridor of Line 2. These residential areas offer low cost housing and easy road access to the re-located factories in the Kimhae area, near the airport; this area is not served by the metro. Anecdotal evidence indicates that this has adversely impacted ridership on Line 1. Benefits to Line 2 are not yet evident, and will be seen as the ridership numbers for Line 2 mature. Overall, suburbanization and motorization trends have led to an increase in average distance travelled, reduced public transport accessibility, and more passenger-car dependent travel patterns.

A major factor in the slower than expected growth of metro usage has been the delay in completion of Line 2. The construction of Line 2 was phased such that the first phase was built in a less populated area to accommodate future growth while the second phase was set in a high density area. While the costs of operating line 2 are already part of PUTA's expenses, ridership from line 2 has still to mature as completion of both phases was substantially behind schedule, and lagged the completion dates estimated at appraisal. Both phases of Line 2 experienced completion delays of about one and a half years each. Since phase II, of Line 2, was completed only in September 2002, ridership numbers for phase II are not yet available, and the usage levels for phase I will be impacted by the opening of Phase II. As patronage on line 2 matures, PUTA's operational cost recovery is expected to increase.

Table 4: Construction Schedule for Line 2

Section	Length (kms)	Scheduled completion	SAR· expected start of operations	Actual start of operations
Line 2: Phase I (Hopo – Somyon)	22.4	1996	1998	June 1999
Line 2. Phase II (Somyon – Jadong)	16.7	1998	2001	September 2002
Line 3	Not part of SAR calculations			Phase I: 2005 (expected) Phase II: 2007 (expected)

Sources: SAR (Annex 4)
ICR mission, 2002

C. Financial Status of PUTA

Going beyond the financial covenant agreed under the Loan, the real concern during appraisal was the sustainability of PUTA's capital financing program. At the end of 1993, the outstanding principal of loans held by PUTA totaled W1,394 billion. Between 1990-93, PUTA's annual borrowings were well in excess of the amount needed to cover construction costs. The net difference was used to meet interest and principal payments on existing debt. The upcoming borrowing requirements for Line 2 were large and also relied on short term debt. The practice of rolling over existing debt with short term debt, in conjunction with borrowing for ongoing construction, had the potential to put PUTA into a position of ever increasing debt.

In December 1993, a debt management plan was formulated whereby the central government committed to

finance 25% and the PCG to finance 20% of PUTA's capital costs with cash grants. However, to strengthen PUTA's balance sheet, during the course of project implementation, the central government and PCG actually contributed a much higher share -- 78% of the investment costs of Line 2 were financed by the central government and PCG. A hundred percent of the capital costs of Line 3 are being borne by the central government and PCG. Despite the higher capital contributions for Line 2, PUTA's financial position has weakened over the course of the project and since 1998, PUTA has received both capital and operating subsidies.

At present, PUTA needs a constant external cash injection each year to meet its cash shortages due to operational losses, ongoing capital investment, and debt service requirements. The subsidy requirements are higher than anticipated at appraisal. For example, in 2001, PUTA received government subsidies of Won 461.8 billion as compared to the estimated Won 132.2 billion, at appraisal. The company's liquidity problems have deteriorated in the 1995-2001 period, with the current ratio falling from 0.75 in 1995 to a very unsatisfactory 0.07 in 2001.

Starting in 1997, PUTA's total debt has exceeded or been equal to its total assets. Further, the ratio of current liabilities (maturities of less than one year) to total debt has increased from about 17% in 1995 to 30 % in 2001. Most of PUTA's debt is inherited from the borrowings for Line 1. It is estimated that about three quarters of all debt has a 3 to 5 year maturity. At the end of 2001, the outstanding principal on loans stood at W1,924 billion and this is expected to continue growing (See Annex 3b, Table 3). Most of PUTA's debts are inherited from the borrowings for Line 1: about 80% of PUTA's total interest payments in 2001, and about 83% of its principal payments in 2001 were on pre-'94 debt. It is clear that PUTA cannot survive without a restructuring of its balance sheet involving either earlier repayment of its debt and/or removal of debt from its balance sheet (See Annex 3b, for scenario analysis). Regardless of the method and timing to clean PUTA's balance sheet, it is likely that in the future the central government will shoulder an even greater burden. After restructuring, the concern would be if PUTA can meet its operational expenses. PUTA's ability to recover operating expenditures will depend on growth in metro ridership and fare increases. It is expected that patronage will improve as Line 2 ridership matures. With regard to fares, although the transit market could potentially absorb higher fares, fare increases would need to be carefully assessed for potential impact on ridership, before implementation.

In sum, the increase in PUTA's overall debt is due mainly to borrowings to finance pre-94 principal and interest payments for Line 1. The situation has been aggravated, in part, by delays in completion of Line 2, motorization and suburbanization trends, and the financial crisis. On the positive side, the government has improved the capital structure for Line 2, funding an increased share of capital costs, and reducing PUTA's debt burden from the construction of Line 2. For Line 3, the local and central government are providing 100% financing. So far, under MOT ownership, PUTA has received financial support from the government, as needed. As per law, the ownership of PUTA has to revert back to PCG in 2007. If this transfer does take place, the sustainability of PUTA's operations will depend on growth in ridership and the City's capacity to provide adequate financial support for PUTA.

4.2 Outputs by components:

Component A. Congestion Management is rated Satisfactory, based on the following:

(i) PCG has changed the city's parking policies to discourage parking and the use of private vehicles in the CBD. City investment for new parking is now mainly directed for park-and-ride facilities for metro passengers at suburban metro stations. In the CBD, parking supply has been reduced and public parking charges have been increased to levels comparable with private parking fees.

(ii) Construction of modal integration facilities was completed in two subway stations – Nopodong and Tongnae – to allow passengers to transfer more easily from one mode to another. These included urban bus turn-arounds, and bus, taxi and car pick up facilities. New park-and-ride facilities were constructed in Nopo (348 car spaces), and in Tongnae the parking lot was expanded, adding 273 parking spaces to reach a total of 419. The benefits from the transfer facilities at the Nopo-dong station were linked to the re-location of the inter-city bus terminal from the CBD to Nopodong. The inter-city bus terminal was completed in September 2001, and monthly ridership at this metro station has already increased by about 20%. Ridership at this station is expected to continue to increase.

(iii) TSM measures to improve traffic performance on the East-West highway were linked to the Tongnae inter-modal facility. A bus priority scheme on a 4.7 km link, along with junction and bus stop improvements, on this highway has increased speeds from 14 kms per hour to over 20 kms per hour. Moreover, operations of the Tongnae Road intersection have improved substantially.

(iv) Congestion management measures identified in the Five-year TDM/TSM Study under the project have become part of the City government's agenda. Implementation of the following, inter alia, is under way: bus priority schemes on 17 road sections totaling 78.14 kms, installation of watching cameras on bus-only lanes; and doubling of parking spaces in park-and ride facilities between 1995 and 2002.

Component B. Expansion of Pusan Urban Transit System is rated Satisfactory. The project has been successful in expanding the service capacity of the metro. The largest share of the loan proceeds ($82.08 million) was used to purchase 336 railways cars (56 trains of 6 cars each) - 26 more than the 310 originally planned. The increase in cars purchased was made possible by the devaluation of the Won while the contract for cars was denominated in Wons. The overall increase in capacity is thus much higher than what was planned at appraisal. According to the technical review for the ICR, the cars purchased meet or exceed the contracted technical specifications, comply with the quality assurance and inspection requirements and are presently being used on Line 2. The number of cars on service on Line 1 have also increased as PUTA used its own funds to procure 60 cars for Line 1.

The total metro network has also expanded significantly since 1994. In 1994, the network consisted of one line with a total length of 32.5 km and 34 stations. During the project implementation period, PUTA expanded its capacity and coverage with the opening of Line 2. With the opening of line 3, scheduled for 2003, the network will have more than tripled in length to about 102 km, with 5 transfer stations, and a total of more than 100 stations. The Bank loan did not finance any of the civil works for network expansion, which cost an estimated 6,000 billion Won (or about USD 6 billion equivalent (See section 5.4 Costs and Financing and Annex 3b). Table 5 below shows the construction costs of the Busan subway.

Table 5: Busan Subway Construction Costs

Line	Construction Period	Length (kms)	Construction costs (billion won)
Line 1 Nopo-Shinpyong	1981-1994	32.5	975.1
Line 2 Phase I Hopo-Somyon	1991-1999	22 4	1,367.1
Line 2 Phase II Somyon-Chwadong	1994-2002	16.7	1,167.0
Line 2 extension (Yangsan Line)	1998-2012	11.3	409.4
Line 3	1996-2007	29.5	2,117.3 (estimated)
Total		**112.4**	**6,035.9**

Component C. Institutional Development was Satisfactory. The various studies under the project were carried out as planned. The Bank reviewed the details of the MOT training program in the earlier stages of implementation. The review indicated a well developed and functioning training program which responds to national needs and is financed accordingly. This reduced the need for Bank follow up and monitoring during supervision.

The Busan Urban Subway Financing Study, completed in September 1996, appears to have influenced the correction of the capital structure for Lines 2 and 3. The government has committed to 100% grant financing for line 3 construction costs, and has substantially increased its contribution to line 2 investments. These are positive developments, however, the government still does not have an articulated debt management strategy and it is not clear how the government plans to reduce existing debt service obligations. PUTA continues to rely on central and local subsidies, along with short term debt, to meet its current debt service requirements.

The Busan Transit Fare Structure Study, completed January 1997, focussed on developing a public transport fare structure based on demand and cost conditions, rather than cost considerations alone. This has provided the PCG a basis for adjusting tariff levels for the metro and bus transport to support increased use of public transport. The City has taken on board recommendations to deepen bus-metro integration through revenue sharing measures.

The Ministry of Transport and the Busan City Government financed and carried out training programs to enhance staff experience in urban transport investment planning and programming at the national and local levels through short- and long-term training courses, workshops, manuals and overseas training programs. The government spent about $0.24 million on this component, much below the $1.92 million estimated in the SAR. No details with regard to the scope and subjects covered, nor the benefits or impact achieved through these activities are available.

The provision of technical assistance to the Transportation Planning Division of Pusan City was not required as the city created, in 1995, the Busan Development Institute. This is a semi-autonomous body which provides analytical support to the city government. The Transportation Planning Division, together with the Busan Development Institute, has kept up the momentum on furthering developing TDM/TSM measures for congestion management.

4.3 Net Present Value/Economic rate of return:
The SAR presented the economic evaluation for investments under Component A - the Nopodong and Tongnae modal integration facilities, and the East-West bus lane improvements. For Component B, the investment in train cars, representing about 85% of total project costs, the Bank team reviewed the economic evaluation completed by MOT. The two step system-wide analysis, followed by a detailed analysis for each line and phase of construction, was found acceptable and a separate calculation was not attempted. This analysis was also used as the basis for calculating the number of train cars required.

The justification for component A was based on user travel time savings and savings in vehicle operating costs for subway-riders switching from private cars to the metro. The EIRRs for the modal interchange facilities were 18% for Nopo and 19% for Tongnae. For the purpose of preparing this report, an economic reevaluation of the modal integration facilities has been completed, following as closely as possible the approach used during appraisal. The quantified benefits include mainly transfer-time savings for subway riders using the improved entry /exit facilities, and reduced travel-times and travel costs for park-and-ride users. The time savings for various users have been evaluated at unit rates estimated during appraisal. As per capita regional incomes have increased over the last decade, the value of time is expected to have increased; economic benefits are therefore likely to be higher than the returns reported here. It is expected that the VOC savings used in the re-evaluation, based on appraisal estimates, understate such savings. Vehicle operating costs are likely to have increased over the last decade due to higher average costs and increased congestion. Higher than expected usage rates of the park and ride facilities are showing internal returns equal to or higher than the appraisal estimates, despite the conservative valuation of benefits. On the cost side, the actual construction and operations and maintenance costs have been used in the re-evaluation, and are lower than forecast in the SAR. The post-project EIRR's are 23 % for Nopo and 18.00% for Tongnae.

For the East-West bus lane, vehicle counts, modal shares and vehicle speeds are not available. Discussions with bus drivers indicate improved speeds and continued occupancy rates. Since motorization rates in the city have increased, the differential in bus speeds in the "with" and "without" scenarios is likely to be higher. The resulting passenger time savings are thus expected to be higher than those cited in the SAR. It is considered likely that the economic benefits of the investments in the East-West highway have been realized. The project has also had a substantial demonstration effect in the introduction of TDM and TSM measures in Busan. While these benefits are not quantified, it is expected that they would increase the post-project EIRR.

4.4 Financial rate of return:
A financial rate of return was not calculated at appraisal and has not been calculated for this ICR. A financial assessment of PUTA has been completed to evaluate the financial viability of the subway system (See Annex 3b). Overall, PUTA's financial situation has deteriorated over 1994-2001. The company has received constant cash injections from government to service debt and since 1998, operating expenses. PUTA remains a high debt company (since 1997, total debt exceeds or is equal to total assets), and about 75% of PUTA's debt has a maturity of 3 to 5 years. At the end of 2001, it is estimated that PUTA's debt stood at W2,765 billion, in comparison to W1,394 billion at the end of 1993. About 80% of the outstanding debt is due to borrowing for investments in Line 1. The capital structure for Lines 2 and 3 has, however, been corrected. 100% of Line 3 investments are financed by the central and local governments and almost 80% of the total capital financing for Line 2 is coming from government. Subway fares increases, exceeding or in step with inflation, have been implemented over the project period.

To improve PUTA's financial viability, PUTA's debt overhang from Line 1 needs to be addressed. Scenario analysis shows that PUTA would be able to balance its income statement from 2008, if 50% of its debt is converted to equity and fares increase annually by 8%. Removal of Line 1 related debt from PUTA's books would allow the income statement to be balanced earlier.

4.5 Institutional development impact:

While it is not always easy to identify how the Bank has influenced individual decisions about reform at the PCG and PUTA level, the overall impact of the Bank's involvement and the project has been very positive. There has been a significant shift within PUTA and PCG from isolated supply-oriented measures to a more balanced supply and demand-oriented perspective; although the practice of developing mode-specific isolated solutions has been changing slowly. Important initiatives have been taken to plan, design and construct a multi-modal and comprehensive urban transport system, and to treat investments and modal policies in a more integrated fashion.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

In 1997-98, Korea was affected by the Asian financial crisis accompanied by a rapid depreciation of its currency. This event had a direct effect on income and employment levels for Busan, the patronage of the metro and the actual financing of the project. The crisis contributed to lower than forecast ridership with obvious consequences for operational cost recovery. In addition to tempering ridership growth directly, the crisis appears to have impacted the completion of phase I, Line 2. This in turn contributed to the lower than expected operational cost recovery. On the positive side, because the contracts for purchase of metro cars were denominated in wons, the depreciation of the won against the US dollar allowed more metro rail cars to be bought (See Section 5.4, Costs and Financing).

Table 6: Population and Vehicle (Forecast versus Actual) Growth

Characteristics	Actual	Forecast	Forecast	Actual
	1991	1997	2001	2001
Population (million)	3.89	4.31	4 54	3.83
Employment (million)	1.61	1.81	1.97	1.654
Vehicle Population	346,400	579,200	813,200	810,000 [1]
Car Population	213,500	360,900	509,100	550,000 [2]
Unlinked Trips/person	1.64	1 82	1.96	1.83
Linked/Trips/person	1.48	1.61	1.71	1.63
Car/person (000)	54.9	83.7	112.1	143.6

Source· Staff Appraisal Report Annex 15

[1] Estimate based on 760,693 vehicles in 1999

[2] Estimate based on 534,132 passenger cars in 1999

Trends in population growth and urban densities did not support ridership levels anticipated at appraisal. A decline in the labor intensive shoe manufacturing sector and affiliated industries in 1995 led to an unanticipated outflow of population (to Seoul or neighboring cities of Kimhae and Yangsan), while immigration from rural and small towns to Busan petered out. Instead of increasing from 3.9 million to 4.5

million over 1991-2001, as expected, the population of Busan actually decreased slightly to 3.8 million. Though population levels remained more or less constant, population densities in the CBD have been declining. The economically active population increased only about 2.5% from 1.61 million to 1.65 million in a decade, and the overall number of daily trips increased about 11%, which is less than expected.

The growth of motorization has been much faster than in the past. Of the approximately 810,000 vehicles in 2001, cars accounted for about 66 percent. The growth in household incomes (despite the financial crisis) over the last decade, the growth of the Korean car industry, and a distortion of urban transport prices in favor of cars has led to increased ownership and use of cars.

The financial crisis and the depreciation of the won affected Korea while procurement of the train cars was under way. Since the contract for the cars was denominated in wons, and the component costs were cited in US dollars, PUTA realized substantial dollar savings in this component. The savings were used to purchase additional cars for the second phase of Line 2.

5.2 Factors generally subject to government control.

The most serious issue regarding PUTA's financial sustainability is its overall debt service level. Though the government had agreed on the need for a long term plan to manage PUTA's debt and the Busan Urban Subway Financing Study was completed, the central government has not yet adopted a plan to address this issue. Addressing PUTA's debt related to Line 1 is critical before the intended transfer of PUTA's ownership from MOT to PCG in 2007. Further, despite low ridership levels on Lines 1 and 2, the Pusan subway expansion plans are continuing to be implemented in line with the national transport vision. This has the potential to worsen PUTA's operational cost recovery in the future. On the positive side, the government is providing 100% grant funding for construction of Line 3, has increased its grant contribution for Line 2 capital costs, and has provided operational subsidies to PUTA as needed.

5.3 Factors generally subject to implementing agency control:

PUTA continues to perform well compared with similar mass transit authorities in the region and world wide. It has improved its management practices and technical knowledge of transport demand management and transport systems management, which in turn has had a positive impact on the achievement of the project objectives and outcomes. Due to the unavailability of long term debt instruments, and inadequate government financial assistance for existing debt, PUTA has had little choice but to contract additional short term debt for servicing current liabilities and to fund part of the capital costs of Line 2. This has weakened PUTA's financial position.

The lack of adequate Bus-metro service and fare integration is one of the factors impeding growth in metro ridership. Progress towards increasing complementarity between the bus and subway system has been slow although some measures, such as the Hanaro card usable interchangeably on buses and the metro, have been implemented. During supervision, Bank aide-memoires underlined the need to speed up work on inter-modal integration in view of the low ridership numbers. The PCG is now developing revenue sharing measures and has committed to implementing these.

5.4 Costs and financing:

The overall project costs decreased by about 45 % (in US$ terms) during implementation. The major source of savings was the lower unit costs of train cars from the bidding process and a further decline due to the depreciation of the Won. The contracted cost per unit car was about 70% of the estimated amount. After the Won's depreciation, the actual costs per car (in US$) were only 43% of the SAR estimate; the savings were used to increase the size of this component. 15% savings were realized in the construction of the Nopo inter-modal facilities while the civil works at Tongnae were 38% higher due to an expansion in

the scope of work. Details on construction costs and funding sources are summarized in this section, with supporting data provided in Annex 2.

Component A. Congestion Management.

The table below presents the sub-projects appraised, and includes investments identified in the 5-year TDM/TSM program study, and completed with loan proceeds and counterpart funds. Most of these sub-projects were contracted and completed before 1997, and therefore were not affected by the financial crisis.

Table 7: Congestion Management Costs

SUB-PROJECT	ACTUAL COSTS [1]	
	(million Won)	(thousand US$)
Transfer Facility & Parking Tongnae	11,594	14,492.5
Transfer Facility & Parking Nopo	9,371	11,713.8
Inter-city Bus Terminal in Nopo-dong	1,647	2,058.8
5-year Traffic Congestion Management Plan	709	886.3
Dongseo Bus-only lane on Chungyeol Road	147	183.8
TSM Gyodae Subway Station	16	20.0
TSM Hadan Subway Station	3	3.8
TOTAL	**23,487**	**29,358.8**

Source: Report on Completion of the Busan City Traffic Management Project (IBRD 3828-KO)
[1] Actual costs estimated using and average exchange rate of 1 US$ = 800 Won

The multi-modal integration facilities in Nopo and Tongnae were contracted and completed before 1997. The total actual cost (US$11.7 million) of the civil works in Nopo were about 15% less than the SAR estimate (US$13.8), while the total actual costs (US$14.5 million) of the works in Tongnae were 38% more than the estimate (US$10.5). The latter increase in costs was due to an increase in the size of the parking lot (273 spaces as compared to 175 spaces). About 32% of the total costs under these contracts were financed with the loan proceeds, as originally envisaged.

Component B. Expansion of the Urban Transit System Capacity.

The contract to purchase the railway cars included a simulator, technical assistance, parts, tools, training and VAT. Actual costs under this component changed significantly during implementation as the contract for the train cars was signed in local currency and the won depreciated in 1997-98. The table below provides relevant cost data.

Table 8: Subway Cars Costs

	Cost Type	Source	# Cars	Date	Won [*]	Exch. Rate	US Dollars [*]	Cost/Car $
[1]	Estimate	SAR	310	15-Nov-94	200,256,000,000	800	250,320,000	**807,484**
[2]	Estimate	SAR	310	15-Nov-94	197,616,000,000	800	247,020,000	**796,839**
[3]	Estimate	PUTA	336	*26-May-95*	173,971,357,500	*766*	227,265,000	**676,384**
[4]	Contract		336	12-Dec-95	142,759,677,010	766	186,492,067	**555,036**
[5]	Actual		336	2-Nov-01	142,759,677,010	*1232*	115,834,056	**344,744**
[6]	Actual + Arbitration		336	15-Dec-99	162,759,677,010	1158	140,547,256	418,295

[*] Costs include cars, simulator, technical assistance, parts, tools and training, and VAT

[1] includes 10% tax, pricecontingencies 2 5%/year foreign and 5%/year local

[2] costs exclude contingencies and include taxes

[3] Date assumed as the same as for Bid oppening Used exchange rate same as contract.

[4] Contract price including taxes

[5] Data for the last disbursement is provided. Actual disbursement period cover Feb 1996 - Nov 2001. Exchange rates vary from 780 to about 1,230 Won per US dollar.

[6] Actual Costs includes the Contractor Price adjustment request presented to the Korea Court of Arbitration An increase on the price by W28 Billion (Dec. 99 Exch Rate $1=W1,133) was US$ equivalent 24,713,200

Component C. Institutional Development.

The actual cost of the studies was US$1.38 million (SAR = US$1.5 million). An average exchange rate of US$1 = W 800 was used to account for the training (W 99,304) and technical assistance (W 99,043) to obtain a total of US$240,000 financed by the implementing agencies, which is only about 13% of the expected amount in the SAR (US$1,910,000).

6. Sustainability

6.1 Rationale for sustainability rating:

The overall sustainability rating of "likely" applies to what the project was most successful in, which is to have (i) expanded the capacity of the metro system, revised public parking policies, and introduced TDM measures; (ii) successfully piloted inter-modal integration facilities at Nopo and Tongnae metro stations, revised public parking policies, and introduced TDM measures; (iii) highlighted the need for and put inter-modal planning firmly on the City's agenda, and (iv) framed PUTA's financial situation discussion in terms of operational cost recovery and sustainability of its debt service.

Regarding the physical assets, it is certain that the new train cars and maintenance facilities have been received by an organization with an established and excellent operations and maintenance culture. The benefits of these investments, all things being equal, will continue over the life of these assets. PUTA has been amongst the top two or three metros in the world in terms of its operational cost recovery; its management is committed to containing costs and introducing measures to increase ridership. External factors and delays in completion of line 2 have had a large role in PUTA's failure to meet operational cost recovery targets. Since 1997, however, the cost recovery ratio has increased every year. The City has initiated bus-metro service and has developed an integrated ticketing system to encourage use of public transport. The City is now reforming the fare system, to introduce differentiation by trip length, location and time of day. Busan City has reached an agreement with Dongnam Bank for the financing of infrastructure (computerized information base) needed for revenue sharing between diverse public transport operators. Traffic demand management measures, such as "Voluntary Driving Restriction Day" and

conversion of company parking lots into commercial lots, have become part of the city's transport agenda and are being continually expanded. All these efforts are highly likely to increase overall ridership levels, specially when combined with an urban transport fares policy responsive to demand and cost conditions. This bodes well for PUTA's operational sustainability.

The issue of PUTA's high and mushrooming debt service has been somewhat mitigated by increases in government contributions to Line 2 investments but overall PUTA's debt has continued to grow. Though a revised debt management plan is not available, the government has committed to providing hundred percent financing for Line 3. The government has also subsidized PUTA's operations, as needed. As long as PUTA remains under central government ownership, the government takes responsibility for its liabilities. Before PUTA reverts to PCG, its former owner, PUTA's balance sheet would need to be re-structured either through early retirement of its debt or through removal of debt from the balance sheet.

6 2 Transition arrangement to regular operations·
The project was implemented by a working metro authority and a City Government. Both organizations are well in control of the various project components and no special transition arrangements are required.

7. Bank and Borrower Performance

Bank
7.1 Lending.
The Bank's performance in the preparation stage of the Project was Satisfactory The CAS and graduation plan for Korea had identified the transport sector, in particular urban transport, as an area where the Bank's expertise would be desirable, and the project was targeted accordingly. The design of the project components was relatively straightforward, and well within the implementing capacity of the project agencies. The Borrower's own experience in project development and past experience with Bank projects meant little time was lost in moving from identification to appraisal and negotiations, all of which were completed in 22 months. The Bank's appraisal was comprehensive. All aspects of individual components, all of which were in an advanced stage of preparation, were addressed in detail. The inter-disciplinary appraisal team was staffed with high level professionals, two urban transport specialists, a senior engineer, a financial analyst, and an environmental specialist.

The strong commitment of the Government and the implementing agencies was correctly assessed, including their commitment to institutional development, and allocation of resources and staff for implementation. The Bank's safeguard policies were appropriately taken into account, including land acquisition and resettlement, even though none of the proceeds of the loan were used to finance the civil works for the construction of the subway lines. While the risks associated with the weak capital structure of PUTA were correctly assessed, the appraisal team was perhaps optimistic as to what PUTA or PCG could realistically do to address the structure of PUTA's debt. While PUTA was responsible for servicing its debt and for preparing an annual debt management plan, the financial instruments available to PUTA for long term borrowing and the level of Government subsidies available were areas where the Government had de facto power.

Even though the size of the IBRD loan (US$100 million) accounted for less than about 7% of the estimated construction costs for Phase I of Line 2 (about US$1,500 million), and less than 2% of the total estimated construction costs of the entire subway system (Line 1, Line 2 and Line 3 US$6,000 million), the Borrower highly appreciated the Bank's involvement and the project's contribution to the development of the public transport system and introduction of TDM/TSM concepts to enhance the efficient use of public transport and the road system in Busan.

7.2 Supervision:

Bank staff performance during supervision was Satisfactory. After graduation, in view of the Client's capacity for implementation, the Bank reduced its supervision efforts to one mission a year. The spacing of supervision missions, approximately once a year, over the project's life was adequate. The missions were adequately focused and provided sound professional guidance to the government. The continuity of the task manager from preparation through supervision, with just one change during supervision, provided consistency for both the Bank and the Borrower. The Bank's supervision missions reviewed the Borrower's progress reports in detail, held discussions with the implementing agencies, and followed up appropriately in action letters. Mission reporting in project status reports was sufficiently detailed and gave realistic performance ratings. Proposed adjustments to the components were extensively reviewed and discussed with the proposing agencies and internally prior to providing no objections. Institutional and financial issues did not receive uniform attention from missions, and could have benefited from a closer review. The Project correspondence indicated that Bank staff were constructive, flexible and responsive to Client requests.

7.3 Overall Bank performance:

Overall, the Bank performance during preparation and implementation was Satisfactory.

Borrower

7.4 Preparation:

The performance of the Borrower during the preparation stage was Satisfactory. With government support and consultant assistance, the implementing agencies prepared the project within 22 months of identification. Technical reports and proposals were of high professional quality. The implementing agencies were committed to the project and allocated adequate staff and resources to project formulation and preparation.

7.5 Government implementation performance:

The satisfactory performance and involvement of the MOT during preparation continued during implementation. Further, the government has decentralized fare setting powers to the local governments, it has increased the city's share in PUTA's capital, and the transfer of PUTA's ownership from MOT to PCG in 2007, remains on track. Apart from support for the agreed investments and procedures, the MOT and subsequently PCG, supported the cost recovery covenant through fare increases in line with (and some greater than) inflation. The MOT's commitment to cost recovery was stronger than its commitment to addressing the capital structure of PUTA. While the central government has provided full grant funding for the expansion of the metro system (construction of line 3) and increased its grant contribution to line 2 capital costs, it has not adequately addressed the issue of PUTA's long term debt obligations. A debt management plan to reduce PUTA's outstanding debt and associated debt service obligations is not available, and PUTA's debt service requirements have continued to increase.

7.6 Implementing Agency:

The performance of both implementing agencies, PUTA and PCG, was Satisfactory. Procurement procedures and contracts were handled with great care by the agencies. Both agencies successfully implemented and supervised their respective components, mostly within the agreed costs, performance parameters and the two year extension time frame. The noncompliance with the cost recovery covenant resulted from a slower growth in metro passengers attributable to the financial crisis, slower population growth, increased suburbanization and motorization, as well as a delay in completion of Line 2. Semi-annual progress reports, environmental reports and annual audit reports were submitted to the Bank in the required time and were of high quality. The Borrower's contributions to the Implementation

Completion Report were submitted to the Bank on time as required.

7.7 Overall Borrower performance:
Overall, the Borrower's performance was Satisfactory.

8. Lessons Learned

The following lessons emerge from the implementation of this Urban Transport Management project.

Public Transport is essential to address congestion but not sufficient to control motorization. Both PT capacity and access to PT are needed for optimal use of PT services. The project has been successful in enhancing metro capacity and demonstrating the importance of integrated public transport services to service usage. It has also effectively demonstrated the importance of demand management measures, such as PT pricing and parking policies. However, availability of PT services is only one factor influencing demand for automobiles. Income levels, car prices, and the relative costs of private vehicles use versus PT use are some of the others. As long as total costs of car usage do not reflect their full social costs, increasing the supply of PT alone is insufficient to deter growth in motorization levels.

Full operating cost recovery in metro systems is possible under the right conditions. The Pusan metro is amongst the few metros worldwide which have the potential and are able to cover operating costs, excluding depreciation of assets. For the most part, the difference in the level of cost recovery is attributable to differences in revenues rather than costs. Both high fares and high levels of usage are needed for operating cost coverage. Though fares were increased over the project period, it was the delays in completion of both phases of Line 2, which led to under-achievement of the targeted 100% cost recovery ratio (the target included asset depreciation and contributions to a replacement fund). Still, the Pusan metro demonstrates that a well run metro system does not need its operational costs subsidized, provided there is a high level of usage and the fares resonate with demand and cost conditions.

Building institutions is necessary for implementation of comprehensive transport management. Urban transport integration and sustainability have significant institutional requirements. In the case of Pusan, the Urban Transportation Planning Unit within the City Government, along with the Busan Development Institute, established at the start of the project, have been responsible for coordinating the implementation of the TDM/TSM measures both within and outside the project. At the same time PUTA was and continues to be a very competent technical organization, and has been an important factor in the success of the project. Without a good coordination between PCG and PUTA, it would have been difficult to pilot the integrated transport management approach of the project.

Up-front initiatives taken by the Government contribute to successful project outcomes. The project has shown that it is extremely useful to require that key reforms – at various decision-making levels – be taken up-front as a clear demonstration of the Borrower's commitment. Examples of those are: (i) the rail transit authority rationalized the subway fare policy to contribute to a self-sustaining operation; (ii) the city government revised the public parking charges and investment policies to promote transit use while inhibiting car use in congested areas; (iii) the Central government committed to decentralizing fare setting powers to local governments, and (iv) the Korean Government put in place an effective and acceptable Environmental Impact Assessment (EIA) procedure and institutional framework to monitor all capital projects, including urban transport infrastructure.

External factors are major determinants of project success or failure. We should never lose sight of the fact that factors well beyond the scope of the project can be major determinants of the success or failure

of project implementation and final outcomes. The financial crisis of 1997-98 impacted the city's population growth, income levels, and more directly subway finances and start of operations of Line 2 which were delayed. Despite extensive attention to PUTA's financial health during project preparation, and PUTA's continued excellent operational performance, the financial targets specified in the project could not be fully met.

9. Partner Comments

(a) Borrower/implementing agency:
Part A is the contribution from PCG, and Part B from PUTA. Appendices 1 - 8 referenced below are available in the ICR project files.

Part A.
Busan Metropolitan City Traffic Planning and Management Department

1. Introduction

The population of Busan was 1.36 million in 1963 when its status was raised to that of a metropolitan city and it has showed continuous growth because of its rapid economic development - 3.16 million in the 1980's and 3.79 million in the 1990's. With the rapid population increase more systematic and effective counterplans became necessary in order to provide its citizens with speedy and comfortable transportation and to solve the traffic congestion problems. Therefore, the Busan Metropolitan City planned and established a new traffic network system focusing on easy connections with neighboring cities and the extension of trunk roads in 1972.

Busan has continuously tried to find ways to disperse the increased heavy traffic such as constructing the first city highway (completed on Oct. 7, 1980), subway line #1 (completed on June 23, 1994), and the second city high way (completed on Dec. 28, 1994). However, Busan still had to face new problems such as how to build a city traffic network that connected with the metropolitan traffic network, how to expand the harbor support roads, how to increase the number of parking lots around some subway stations, and how to easily transfer between bus and subway lines.

To solve these new problems Busan, due to its poor financial status in March 1995, obtained a loan for US$100,000,000 from IBRD (International Bank for Reconstruction and Development). The Busan Metropolitan City Government budgeted US$17,500,000 for the purpose of establishing better transfer facilities in order to induce its citizens to use the subway more frequently.

The balance of US$82,500,000 was to be distributed to the Busan Urban Transit Authority for the purpose of purchasing subway trains. Busan city completed the transfer facilities project with only US$9,568,621.72 by parring down expenses.

2. Purpose

The purpose of The Busan City Traffic Management Project was to provide the citizens of Busan with a more comfortable and pleasant city life which included establishing transfer centers to improve the efficiency of subway line 1.

3. Expansion

The Busan Urban Transit Authority applied for a loan from IBRD (International Bank for Reconstruction and Development) to construct subway line #1 on March, 9, 1992. IBRD agreed to the loan only under the condition that the Busan Urban Transit Authority would also plan a total inter-model system on May, 1992. An M.O.U. (Memorandum Of Understanding) between the Korean government and IBRD was made on March, 3, 1995.

■ **Total loan amount: US$100,000,000**

- **Busan Metropolitan City's allotment: US$17,500,000**
  - Expenses budged for establishing transfer facilities and managing traffic congestion: US$16,000,000
  - Expenses budged for purchasing traffic managing equipment: US$500,000
  - Expenses budged for a 5-year traffic congestion management plan: US$1,000,000

- **Busan Urban Transit Authority's allotment: US$82,500,000**
- **Expense Budget**

Expense Budget Details

(Unit: US$10,000)

Name of the sub projects		Total Expense	Busan Metropolitan City's allotment	Remarks
Total		5,408	1,750	
Traffic Congestion Management	Sub Total	5,104	1,600	
	Establishing transfer facilities	2,798	878	
	Establishing Dongseo bus only lane	218	68	
	Establishing 5-year traffic congestion management plan	2,088	654	
Traffic System Improvement	Traffic Management project	192	50	
Professional Development Companies	Researching and developing companies to carry out 5-year traffic congestion management plan	112	100	

4. Performance

- The project was composed of five sub projects to 1.) build parking lots and transfer facilities at Nopo-dong and Dongnae subway stops, 2.) build TSM, 3.) build a Dongseo bus only lane, 4.) develop a 5-year traffic congestion management plan, and 5.) move the intercity bus terminal in Nopo-dong. The biggest of the sub projects, building the parking lots and transfer facilities, was constructed by Daeseong Construction Co. Ltd., Heungguk Construction Co. Ltd., and Saerim Landscape Co. Ltd. and the constructional materials were purchased from supplying administration.
- No technical construction difficulties occurred due to the accumulated experience and know-how of the three construction companies used to build the parking lots and transfer facilities.
- There was no significant increase in the number of passengers per day using the Nopo-dong station after building the transfer facility and parking lot.

— The number of passenger per day using the Nopo-dong subway station —

(Unit: people)

Name of the subway station	1998	1999	2000	2001	Remarks
Nopo-dong	4,210,992	4,543,097	3,997,753	4,408,055	

However, the number of passengers is predicted to increase gradually with the completion of the new bus terminal which was expected to be a main factor for the success of this sub project.

o Sub projects details

(Unit: 1 million won)

Sub Project	Outline	Calculated Expense	Alloted	Actual	Status
Transfer facility and parking lot in Nopo-dong subway station	0 Parking Lot -Size:L=265m, B=9-59m, A=12,710m2 -One Toll House. A=50.57m2 0 Transfer facility -Size:L=135m, B=7.3-33.3m, A=3,699m2 -One additional building	9,371	2,999	2,999	completed
Transfer facility and parking lot in Dongnae subway station	0 Parking Lot -Size:L=100m, B=46.7-48.1m, A=7,629m2 0 Transfer facility -Size:L=172.3m, B=43.5-48.1m, A=11,678.5m2 -Wall: H=3-4m, L=260m H=6.5-7.5m, L=187m	11,594	3,710	3,710	completed
5-year traffic congestion management plan		709	709	709	completed
TSM Gyodae subway station		16	5	5	completed
TSM Hadan subway station		3	1	1	completed
Dongseo bus only lane on Chungyeol road		147	47	47	completed
The intercity bus terminal in Nopo-dong		1,647	536	536	completed

- **Utilization of Facilities and results of research and development**
- **The number of parking lot users in Nopo-dong and Dongnae**

(Unit: 1 car)

Name of Subway station	Parking Capacity	Number of cars					Remarks
		1997	1998	1999	2000	2001	
Nopo-dong	348	143,665	173,212	172,377	138,790	174,995	
Dongnae	419	213,890	237,710	241,956	235,462	259,119	

- **Transfer Facilities**

o Nopo-dong Station
- Present Status of Utilization: Record shows an even distribution usage of the facility.
- Plan: To continue to promote and manage the facility now that the new intercity bus terminal has been built.

o Dongnae Station
- Present Status of Utilization:

Routes	1997		2002		Remarks
	No of bus companies stopping at Dongnae	No. of buses stopping at Dongnae	No. of bus company stopping at Dongnae	No. of buses stopping at Dongnae	
Daedong Hospital --> Naeseong Intersection	12	136	32	416	
Dongnae Rotary --> Myeongryun-dong Subway Station	3	29	3	32	
Dongnae Rotary --> Gyeodae Subway Station	9	107	12	150	
Naeseong Intersection --> Daedong Hospital	19	273	18	233	
Minam Rotary --> Dongnae Rotary	11	179	16	240	
Gyeodae Subway Station --> Dongnae Rotary	8	96	9	117	

o **Performance expected from the 5-year Traffic Congestion Management Plan (TDM/TSM)**

o Converting lanes to bus only lanes: 17 sections - totaling 78.14 km

Street Name	Section	Length (km)	Operating hours	Remarks
Jagalchi Road	Chungmu Intersection --> Nampo Police Station	1	24 hours a day	one way
Myeongryun Road	Suan Intersection --> Myeongryun Elementary School	0.7	24 hours a day	one way
Gudeok Road	Old City Hall Intersection --> Jalgachi Intersection	0.7	07:00-09:00 17:00-21:00	one way
Jungang Road	Geumjeong Police Station <--> Old City Hall Intersection	17.77	07:00-09:00 17:00-21:00	two way
	Daeti Tunnel Entrance <--> Handan Intersection	3 9	07:00-09:00 17:00-21:00	two way
Nakdong Road	Gupo Overpass <--> Nadkdong Gas Station	1	07:00-09·00 17:00-21:00	two way
Chungyeol Roda	Wondong Interchange <--> Minam Intersection	4 8	07:00-09:00 17:00-21:00	two way
Mandeok Road	Gwangdeok Mulsan Co. Ltd. <--> Deokcheon Rotary	1.8	07.00-09:00 17:00-21:00	two way
Suyeong Road	KBS Three Way Intersection --> Munhyeon Intersection	3.8	07:00-09:00	two way
	Munhyeon Intersection --> KBS Three Way Intersection	3.8	17:00-21:00	two way
Geumjeong Road	Geumjeong Police Station <--> Busan Bus Terminal	4.8	07:00-09:00 17:00-21:00	two way

o Install watching cameras on bus only lanes: 16 cameras

Road Name	No.	Location	Direction
Jungang Road	1	In front of Korea Electric Power Corporation in Bujeong-dong, Busanjin-gu	Jungang-dong --> Nopo-dong
	2	Next to KBS in Choryang-dong, Dong-gu	Nopo-dong --> Jungang-dong
	3	In front of Busanjin Railway Station in Jwacheon-dong, Dong-gu	Jungang-dong --> Nopo-dong
	4	In front of Song Sang Hyeon's statue in Yangjeong, Busanjin-gu	Nopo-dong --> Jungang-dong
	5	Across from the Oncheonjang Subway Stop in Oncheon-dong, Dongnae-gu	Nopo-dong --> Jungang-dong
	6	In front of Busan Cable TV Broadcasting Bldg in Oncheon-dong, Dongnae-gu	Nopo-dong --> Jungang-dong
	7	Across from the Busan Cable TV Broadcasting in Oncheon-dong, Dongnae-gu	Jungang-dong --> Nopo-dong
	8	In front of Yangjeong-3dong Police Station in Yangjeong-dong Busanjin-gu	Jungang-dong --> Nopo-dong
Suyeong Road	9	Above Daeyeong Hill in Daeyeong-dong, Nam-gu	Munhyeon Intersection --> KBS Three way intersection
Jungang Road	10	In front of the Mibo Pharmacy in Choryang-dong, Dong-gu	Nopo-dong --> Jungang-dong
	11	In front of the Busan Railway Station in Choryang-dong, Dong-gu	Jungang-dong --> Nopo-dong
	12	Behind Furniture Street in Jwacheon-dong. Dong-gu	Nopo-dong --> Jungang-dong
Nakdong Road	13	In front of Hanil Gas Co. in Goijeong-dong, Saha-gu	Daeti Tunnel --> Hadan Rotary
	14	In front of the Goijeong Market Pharmacy in Goijeong-dong, Saha-gu	Hadan Rotary --> Daeti Tunnel
	15	In front of the Goijeong4 Saemaeul Bank in Goijeong-dong, in Saha-gu	Daeti Tunnel --> Hadan Rotary
	16	In front of the Goryeo Paint Co in Hadan-dong, Saha-gu	Hadan Rotary --> Daeti Tunnel

* Operating Hours: the office-going hour (07:00-09:00), the closing hour (17:00-21:00), and on Saturday (07:00-09:00)

- **Strengthening Traffic Demand Management**

The esssence of traffic demand management is to reduce the traffic volume, especially for passenger cars which have low transportation efficiency and to convert those drivers into public transportation users.

(1) Traffic Demand Management for Companies

- Benefits for the participating companies: Reduced taxes imposed on car owners.
- Main contents: Compulsory plan (converting company parking lots into toll parking lots) Additional plan (compulsory restricted driving days, etc.)
- progress
  - Dec. 1994: Revised the ordinance regarding city traffic management.

- Oct. 1995: Held a public hearing to gather public opinion on traffic demand management.
- Jun. 1996: The ordinance regarding city traffic management was amended (decreasing the tax rate for company owned cars).
- Jul. 1997: Held a public hearing for companies to gather public opinion on traffic demand management.
- Jul. 31, 1999: Published a guide line for the utilization of traffic demand management.
- Oct. 2000: Participating companies were supervised and inspected by the Traffic Demand Management Department.

(2) Voluntary Driving Restriction Day

- Outline
  - Private car owners whose license plate's last number matches the last number of the day of the month should not drive their car on that day from 7 am to 9 pm.
  - Started March 1999 and excludes holidays and the 31st of the month.
  - Revised the laws and ordinances to accomodate the restricted driving day program for private cars.

  - Incentives and penalties
    - Incentives: City highway toll exemption during the rush hours, 20% discount on an official parking lot, etc.
    - Penalties: Restricting parking in any official building, 20% additional charge for using an official parking lot, etc.
- Plans
  - To promote the use of car pools to increase the adoption of the voluntary restricted driving days program.
  - Select certain apartment complexes to monitor effectiveness of the carpool system.
  - Modify and revise the incentives and penalties system.

(3) Public Transportation Day

- Outline
  - Time: The first Monday of every month from Nov. 2000.
  - Participation:
    - Compulsory for all governmental officials.
    - Voluntary participation for citizens.

- Promoting Public Transportation Day
  - Holding advertising campaigns
    - Advertising campaigns organized by each district office will be held on every Public Transportation Day.
    - Monthly advertising campaigns organized by Bus Unions and civic organizations.
  - Promotions via the media
    - Broadcasting on MBC (Munhwa Broadcasting Corporation) radio station on Tuesdays and on TBN (Traffic Broadcasting Network) on Thursdays.
    - Voice announcements and notices on electronic marquees in every subway station.

- Plan
  - Promotions in conjunction with the 2002 World Cup and the Asian Games.

□ **Plans for utilizing public transportation**

(1) Hanaro Transportation Card

- Background
  - o Dongnam Bank developed a cash card approved by the Ministry of Finance and Economy on Dec. 12, 2000.
  - o Busan Metropolitan City and Dongnam Bank agreed on building an infrastructure to accomodate the use of the transportation card for all types of public transportation.

- Benefits
  - o To the citizens: makes using the public transportation system more convenient.
    - No need to carry coins, tokens, or other boarding tickets.
    - Discount fares for the subway and bus.
    - Makes using all types of public transportation easier.
  - o To the transportation companies: Improved efficiency by computerizing revenues
    - Improved management efficiency by having computerized income
    - Increased passengers
    - Improved relationship between labor and management by clarifying income.
  - o To the city government: improves traffic management by having more accurate and more timely public transportation usage data
    - Improved data for use in expansion plans for future traffic plans.
    - Improved data for use in setting transportation fares.
  - o To the Korean government
    - Reduces currency in circulation.

- Procedures
  - o Jul. 1995: Established a plan for creating the system
  - o Dec. 1995: Developed the organizational responsibilities for operating the system.
  - o Feb. 1996: A fundamental agreement on operational responsibilities was signed by 8 participating organizations and companies.
  - o Mar. 1996: Selection of companies to develope the electronic accounting system.
    - Subway and Bus: Gyeongdeok Electronics Co. Ltd.
    - Taxi: KD Communication Co. Ltd.
  - o Aug. 1996: An agreement on how to operate the Hanaro Card system was signed.
  - o Sep. 1997: Partial implementation was begun.
    - Subway line #1: 581 gates
    - Bus lines: 507 buses
    - Recharging outlets: 84 locations (50 in subway stations and 34 street locations)
  - o Feb. 1998: Full implementation was begun.
    - Subway line #1: 581 gates in 34 stations
    - Bus lines: 3,003 buses
  - o Jun. 1998: Partial implementation was begun for local area buses (84) and city highway toll gates (6).
  - o Aug. 1998: Full implementation was begun for all local area buses (except for Gangseo and Gijang) and all city highway toll gates.
  - o Jun. 1999: Full implementation was begun for subway line #2 (21 stations and 372 gates)
  - o Mar. 2001: Full implementation was begun for 4 tunnels (Baekyang, Hwangyeong, Mandeok, and Gudeok totaling 36 gates)
  - o Aug. 2001: Expanded implementation for subway line #2 on 9 additional stations.

(2) Taxi Information Project (TIP)

- Features: payment by credit cards and issuing of receipts, use of centralized five language translation center, and improved call service.
- Use of the TIP system was begun by privately owned taxis in Feb. 2002 and corporately owned taxis in July totaling 24,347 cars.

(3) Traffic information collecting system

- Outline: Provide traffic information to drivers
- Information: traffic reports and suggest alternative routes, direction information.
- Method: Internet, ARS (Automatic Response System), Mobile phone, and highway and street marquees.

5. The Bank's role

IBRD played a major role in the success of the project by financing the project and lending their expertise in construction, technical and financial matters.

6. Project related organizations

- Traffic Planning and Management Department
  The department took a major role as a organizer by planning the city traffic management project, the budget, and detecting deficiencies and correcting them.

- Busan Metropolitan Police Agency
  Provided full cooperation and assistance with Busan Metropolitan City regrading the traffic signal systems and lane changing usage,

- Supervising Organization
  Provided supervision on construction and testing the system.

7. The Role of the Busan Metropolitan City

The Busan Metropolitan City did everything possible to ensure the success of the project by providing all the necessary data required. They held numberous meeting with reluctant companies to iron out any and all problems as the project was being implemented. They also helped developed the various traffic management policies. As a result of their efforts successful results are being seen in every aspect of the project.

8. The Valuation of the Result

The results since the project has been completed have been very satisfactory to date.

9. Future Management

- Facilities and operation of the system.
  - The efficiency in connecting between the subway system and the bus system will have to be improved. Busan Facility Management Corporation, which is in charge of managing this, will have

to make a greater effort to improve upon this system.

- o The traffic flow has been improved in the city center as a result of moving the intercity bus terminal. However, there is not a noticeable change in the number of passengers using the subway system even after its removal. A greater effort to provide incentives to use the subway system such as extending the hours of operation and reducing the fees for using the parking lots should be considered.

- o Traffic congestion has to be minimized by determining the traffic flow in the city at all times and by determining better usage of lanes.

---

9. Partner Comments (Continued)
(a) Borrower/implementing agency:

Part B.
Pusan Urban Transit Authority Implementation Closing Report IBRD Loan 3828-KO, April 2002

1. Preface

- This loan contract was made between REPUBLIC OF KOREA (the Borrower)and INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT(the Bank) projects to proceed clearly one of infrastructure building projects, "Pusan Urban Transport Management Project" with the loan.

- The project is composed of PART (A), PART (B) and PART (C). Pusan City of Government performed PART (A) and PART (C), PUTA did PART (B).

- PART(B) was consisted with two to improve the growing traffic congestion and tighten the Pusan Urban Transit System Capacity.

  The first thing is PUTA's responsibility for the subway expansion (procuring subway 336 railcars).
  The second one is to appoint consultants to conduct the Pusan Transit Fare Structure Study and the study for the identification of the alternative long-term subway financing.

- PUTA received $82.5(mil.) to proceed the project all from IBRD Loan by subsidiary Loan Agreement between Republic Of Korea and Pusan Urban Transit authority and finished the project. The project was made from Feb. 1996 to Mar. 2002 for 6 years. PUTA now finishes it and hand out ICR to IBRD.

2. Project Purpose

- Under PART (B), the project's overall purpose is to initiate a multi-modal urban transport management strategy in Pusan. That is, by opening Line 2 (Hopo - Somyon) reaching East and West, connected with Line 1 reaching North and South in Pusan to expand transport capacity and increase the proportion of total trips served by subway.
- In details, the first thing, is to receive IBRD Loan Funds for opening Line 2.

From the sensitivity analysis by IBRD, the result shows that PUTA can retain a healthy working ratio by making relatively small changes in fares that are indexed to inflation and must receive additional cash from the PCG or the Government. So, PUTA will implement the Transit Fare Structure Study and a study for alternative long-term financing strategies.

3. Project Status

- To proceed the project, PUTA abided by Procurement and Consultants Services written on the Schedule of PUTA project Agreement.
- After a bid announcement Mar. 27. 1995, six companies participated the bid. Contracted with Hanjin Heavy Industries Co./GEC Alsthom U.K. for the delivery of 336 railcars on Dec. 28. 1995 with IBRD's approval amounting to 135.5 billion (excluding. VAT).
- The deliveries of 168 rail cars for Phase 1 were concluded on Dec. 2. 1998 from Jan. 5. 1998 with 10th delivery. Phase 1 Line 2 (Hopo-Somyon)-22.4km opened on Jun. 30. 1999
- Partial section (Somyon-Geumnyeonsan) of Phase 2 Line 2 (Somyon-Jangsan.) opened on Aug. 8. 2001. The rest of Phase 2 Line 2 will open on August 2002. 168 railcars for Phase 2 finished the delivery on Mar. 2002 with 18 railcars, indicating the end of deliveries-336 railcars.
- With approval of IBRD, PUTA's long-term financing strategy consultants services was made a contract with The Korea Transport Institute, initiated the study cooperated technology with Arthur Anderson and received final report on Sep. 1996 amounting to 357,600,000
- For the project, PUTA $420,187.29 was used for PUTA's financial study consultant services. The rest $82,079,812.71 was used for procuring electric railcars and the deficit amount for railcars was fulfilled with internal funds.

4. Project Objective/Achievement

(1) Objective

- Given the geographical constraints the project objective is 1) to expand the roads, to release traffic-congestion and enlarge the overall capacity of the transport system in subway.
  In addition, by increasing Internal Sources (Ticket Sales and Operating Revenue), 2)to meet the working costs and vehicle depreciation.
- According to final report of Sunway Financing Study consultants Services, 3) to increase fares side by side and expand subsidiary funds from the Government and PCG for overcoming the financial deficit from 1996 ~ 2001.

(2) Achievement

- After opening of phase 1 Line 2 in 1999, subway transport capacity, ticket sales and the proportion of total trips increased well compared to those of 1995's, original year of borrowing the Loan.
- Internal Sources will meet the vehicle depreciation after opening the total Phase 2 Line 2 on August. 2002 because of anticipating hikes of them.
- PUTA receives Construction Cost from(the Government 50%, PCG 50%), prospects no additional debt increases and 60%-70% of interest payment for operating cost from the Government every year (At first, promised 100% subsidy, currently receiving 60%, due to the budget lackness, anticipating subsidy increase)
- PUTA's Debt Service Coverage increases, financial prospect is hopeful.

(Reference to Appendix 1-8 attached)
Note: Appendices 1 - 8 referenced are available in the ICR project files.

o Subway tranport capacity status (000s/mil.)

Year	Average Riderships (day)	Total Riderships	Average Revenue (day)	Total	Proportion of total trips (%)
1995	586	213,799	198	72,150	8.7
1996	597	218,347	222	81,110	9.75
1997	598	218,307	234	85,386	9.8
1998	557	203,430	221	80,713	10.5
1999	664	224,254	266	89,413	11.9
2000	658	240,920	291	106,569	11.5
2001	711	250,238	355	124,963	12.6

o Subsidy from the Government and PCG (W100mil.)

Year	Total	Government		PCG
		Operation	Construction	
1995	2,980	900	1,125	955
1996	4,120	1,301	1,610	1,209
1997	3,562	1,521	1,397	644
1998	3,855	1,335	1,306	1,214
1999	4,564	1,419	1,287	1,858
2000	5,714	1,503	1,967	2,268
2001	5,466	1,196	2,109	2,161

- In environment side, PUTA tries to below the minimum level of air pollution in station in Line 1 and underground tunnels. For those efforts, we do our best to improve air handling filter purifying system, install main line sprinkler equipment, remodel feeding tower, clean ventilating duct.
- In Line 2 and Line 3, also the survey is performed for Air, Water, Noise/Vibration every year.

5. Role of The Bank

- Every year the mission team visited to KOREA to check the project status, technical matters, requirements agreed between PUTA and IBRD by the Bank's supervision schedule.
- Approval just in time from IBRD for withdrawal application led to proceed the project without matters.

6. Role of PUTA

- PUTA implemented the project clearly with observance of the agreements between PUTA and the Bank and advises from the Bank, handed out the project execution status, financial forecast, EX POST FACTO REPORT ENVIRONMENT SURVEY. PUTA made an end to the subway financial study and makes great efforts to improve financial viability.

7. Evaluation

- PUTA is greatly satisfied with the well-performed project and the Bank's cooperation without any problem .

(b) Cofinanciers
Not applicable.

(c) Other partners (NGOs/private sector):
Not applicable.

10. Additional Information

Annex 1. Key Performance Indicators/Log Frame Matrix

Outcome / Impact Indicators:

Indicator/Matrix	Projected in last PSR[1]	Actual/Latest Estimate
PUSAN CITY GOVERNMENT		[Calculated based on 280 days/year]
Modal Integration		
- Vehicles/parking space/day at Nopo	1997 0 9 veh/sp/day 1999. 0 9 veh/sp/day	1997 1.47 veh/sp/day 1999 1 77 veh/sp/day 2001 1 80 veh/sp/day
- Vehicles/parking space/day at Tongnae	1997 1 6 veh/sp/day 1999 2 2 veh/sp/day	1997 1 82 veh/sp/day 1999 2 06 veh/sp/day 2001 2.21 veh/sp/day
PUTA OPERATIONS	Year Total	Year Total
- Total annual ridership	1995 230 22	1995 213 80
[million passengers]	1996 232 77	1996 218 35
	1997 241.39	1997 218.31
	1998 335 42	1998 203.43
	1999 441 17	1999 224 25
	2000 446 38	2000 240 92
	2001 528.91	2001 250.24
AVERAGE DAILY BOARDINGS	Year Peak Daily	Year Peak Daily
Nopo Station	1993 950 11,230	
[closed until May 97 for construction of the	1997 1,325 15,654	1997 714 11,360
modal integration facility]	2001 1,535 18,100	2001 1,454 14,038
Tongnae Station	1993 4,030 21,630	
	1997 5,615 30,140	1997 2,795 27,754
	2001 6,500 34,820	2001 4,103 27,660
PUTA FINANCIAL PERFORMANCE	YEAR	YEAR
	1999 2000 2001	1999 2000 2001
- Operations Revenue [million Won]	180,854 200,769 236,566	96,173 116,834 138,603
- Operations Expenses [million Won]	203,332 216,476 269,588	182,172 184,161 206,003
- Working Ratio	74 2% 72 1% 67 6%	125.7% 109 3% 105 0%
- Operating Ratio	112 4% 107.8% 114.0%	189 4% 157.6% 148 6%
- Recovery of Working Costs and		
Depreciation of Rolling Stock	116 1% 118 9% 122.1%	73 5% 84 4% 87 6%
- Rate of Return on Net Fixed Assets	-1 3% -0 9% -1.2%	-1 9% -5 2% -4 3%
- Debt Service Coverage Ratio	1 01 1 00 0.98	1.39 1 28 1 13

Output Indicators:

Indicator/Matrix	Projected in last PSR[1]	Actual/Latest Estimate
Number of subway cars purchased using	310 in total	336 subway cars for Line 2
loan proceeds	52 for Line 1 and 258 for Line 2	
Construction of Transfer Facility and Parking	In Tongnae	Completed
Lots	In Nopo	Completed
Implementation of additional TSM measures	TSM Gyodae Subway Station	Completed
	TSM Hadan Subway Station	Completed
Construction of inter-city bus terminal	In Nopo-dong	Completed
Converting lanes to bus-only lane	One (1) section 4 7 Km on Chungyeol Road	Seventeen (17) Sections for a total of 78 1 km [2 4 one way and 75 7 km two way]
Contract and implementation of three studies	Pusan Urban Transit Fare Structure Study	Completed
	5-year TDM/TSM Program Study	Completed
	Long-term Financing Strategies for Subway Projects in Pusan	Completed

[1] End of project

The figures presented as Projected in last PSR are found in the Staff Appraisal Report, November 1994.

Annex 2. Project Costs and Financing

Project Cost by Component (in US$ million equivalent)

Component	Appraisal Estimate US$ million	Actual/Latest Estimate US$ million	Percentage of Appraisal
Component A. Congestion Management	36.30	29.36	
Component B. Expansion of Urban Transit System Capacity - Subway Cars	247.00	171.03	
Component C. Institutional Development			
Studies	1.50	1.38	
Training	1.80	0.12	
Technical Assistance	0.10	0.12	
Total Baseline Cost	286.70	202.01	
Physical Contingencies	6.60		
Price Contingencies	39.10		
Total Project Costs	332.40	202.01	
Total Financing Required	332.40	202.01	

Total Project Costs by Component excluding taxes estimated at US$32.9 million equivalent. The actual costs presented in the table include contingencies.

Project Costs by Procurement Arrangements (Appraisal Estimate) (US$ million equivalent)

Expenditure Category	Procurement Method[1] ICB	NCB	Other[2]	N.B.F.	Total Cost
1. Works	0.00	51.00	0.00	0.00	51.00
	(0.00)	(16.00)	(0.00)	(0.00)	(16.00)
2. Goods	250.30	1.95	0.00	58.70	310.95
	(82.00)	(0.50)	(0.00)	(0.00)	(82.50)
3. Services	0.00	0.00	1.50	1.91	3.41
	(0.00)	(0.00)	(1.50)	(0.00)	(1.50)
Total	250.30	52.95	1.50	60.61	365.36
	(82.00)	(16.50)	(1.50)	(0.00)	(100.00)

Project Costs by Procurement Arrangements include taxes and duties.

Project Costs by Procurement Arrangements (Actual/Latest Estimate) (US$ million equivalent)

Expenditure Category	Procurement Method[1] ICB	NCB	Other[2]	N.B.F.	Total Cost
1. Works	0.00	29.36	0.00	31.80	61.16
	(0.00)	(8.94)	(0.00)	(0.00)	(8.94)
2. Goods	115.83	0.00	0.00	23.40	139.23
	(82.08)	(0.00)	(0.00)	(0.00)	(82.08)
3. Services	0.00	0.00	1.38	0.24	1.62
	(0.00)	(0.00)	(1.05)	(0.00)	(1.05)
Total	115.83	29.36	1.38	55.44	202.01
	(82.08)	(8.94)	(1.05)	(0.00)	(92.07)

A total amount of $7,931,005.09 was cancelled from the Loan.

[1/] Figures in parenthesis are the amounts to be financed by the Bank Loan. All costs include contingencies

[2/] Includes civil works and goods to be procured through national shopping, consulting services, services of contracted staff of the project management office, training, technical assistance services, and incremental operating costs related to (i) managing the project, and (ii) re-lending project funds to local government units.

Project Financing by Component (in US$ million equivalent)

Component	Appraisal Estimate			Actual/Latest Estimate			Percentage of Appraisal		
	Bank	Govt.	CoF.	Bank	Govt.	CoF.	Bank	Govt.	CoF.
A: Congestion Management	16.50	36.42		8 94	20.42		54.2	56.1	
B: Pusan Urban Transit System Capacity Expansion	82.00	227.02		82.08	88.95		100.1	39.2	
C: Institutional Development	1.50	1.91		1.05	0.57		70.0	29.8	
TOTAL	100.00	265.35		92.07	109.95		92.1	41.4	

CONSTRUCTION INVESTMENT PLAN - LINE 2

Description	Unit		Total Cost (in Billion Won)	Total Cost [1] (in million US$)	Percentage of Total
Planning, Design & Inspection	1	Global	51.7	64.63	2.4%
Land Purchase & Compensation	379,058	m2	76.6	95.75	3.6%
Engineering Work	39.1	km	1,315.6	1,644.50	61.1%
Station Construction	37	stations	144.5	180.63	6.7%
Track Construction	112.16	km	58 5	73.13	2.7%
Electrics Construction	39.1	km	97.6	122.00	4.5%
Signal Equip. Construction	39.1	km	48.1	60.13	2.2%
Communications Facilities Const.	39.1	km	71.1	88.88	3.3%
Ventilation Facilities Construction	36.8	km	80.8	101.00	3.8%
Testing & Factory Facilities Const.	1	Global	15.3	19.13	0.7%
Car Purchase	336	cars	145 1	181.38	6.7%
Miscelaneous Expenses	1	Global	48.0	60.00	2.2%
Total			**2,152.9**	**2,691.1**	**100%**

CONSTRUCTION FINANCING PLAN - LINE 2 [39.1 km]

Description	Total Cost (in Billion Won)	Total Cost [1] (in million US$)	Percentage of Total
Government Assistance	600.1	750.13	27.9%
Government Loans	113.5	141.88	5.3%
Pusan City Assistance	400.1	500.13	18.6%
IBRD Loan	63.6	79.50	3.0%
Loans	823	1,028.75	38.2%
Development Profit	152.6	190.75	7.1%
Total	2,152.9	2,691.13	100%

CONSTRUCTION FINANCING PLAN - LINE 2 Ext. (Yangsan Line) [7.9 km]

Description	Total Cost (in Billion Won)	Total Cost [1] (in million US$)	Percentage of Total
PUTA	30.1	37.63	14.5%
Korea Land Authority	178.2	222.75	85.5%
Total	208.3	260.38	100%

CONSTRUCTION FINANCING PLAN - LINE 3 [29.5 km]

Description	Total Cost (in Billion Won)	Total Cost [1] (in million US$)	Percentage of Total
Government Assistance	421.6	527.00	30.0%
Pusan City Assistance	421.6	527.00	30.0%
Loans	562.1	702.63	40.0%
Total	1405.3	1,756.63	100%

[1] Exchange Rate October 1996 **US$ 1 = 800**

Source: Pusan Urban Subway Financing Study Final Report, Arthur Andersen (Korea Office), October 1996.

Annex 3. Economic Costs and Benefits

Annex 3.a

ECONOMIC EVALUATION

The following table provide the assumptions and results of economic evaluation for Component A investments in the Nopodong and Tongnae inter-modal facilities: Table 1 for Nopodong improvements, and Table 2 for investments in Tongnae. Table 3 shows the history of metro fare increases.

The EIRR for the East-West bus lane improvements has not been calculated for this report. However, reported changes in vehicle speeds along this corridor are in line with appraisal estimates, and benefits in terms of savings in travel time and vehicle operating costs are likely to have been achieved.

Table 1: Economic evaluation of Nopo-dong inter-modal facilities

	Year	Costs (million Won)				Benefits (million Won)					
		Cons-truction costs	P&R Lot O&M costs	Total costs	PV of total costs	Time savings by P&R users	VOC savings by P&R users	Time savings by bus bay users	Time savings by bus layover users	Total benefits	PV of total benefits
[1]	1995	3,131.8		3,131.8	3,131.8					0.0	0.0
[1]	1996	5,302.1		5,302.1	4,734.0					0.0	0.0
	1997		200.0	200.0	159.4	549.5	1,010.1	80.8	133.5	1,773.8	1,414.1
	1998		200.0	200.0	142.4	788.4	1,277.0	83.4	152.1	2,301 0	1,637.8
	1999		200.0	200.0	127.1	928 9	1,325.2	86.2	175.6	2,515.8	1,598.9
[7]	2000		200.0	200.0	113.5	857.4	1,096.8	89.1	207.3	2,250 6	1,277.0
	2001		200.0	200.0	101 3	1,045.1	1,195.5	92.0	245.3	2,577 9	1,306.1
	2002		200.0	200.0	90.5	1,045.1	1,195.5	92.0	245.3	2,577.9	1,166.1
	2003		200.0	200.0	80.8	1,045.1	1,195.5	92.0	245.3	2,577.9	1,041 2
	2004		200.0	200.0	72.1	1,045.1	1,195.5	92.0	245.3	2,577.9	929.6
	2005		200.0	200.0	64.4	1,045.1	1,195.5	92.0	245.3	2,577.9	830.0
	2006		200.0	200.0	57.5	1,045.1	1,195.5	92.0	245.3	2,577.9	741.1
	2007		200.0	200.0	51.3	1,045.1	1,195.5	92.0	245.3	2,577.9	661.7
	2008		200 0	200.0	45.8	1,045.1	1,195.5	92.0	245.3	2,577.9	590.8
	2009		200.0	200.0	40.9	1,045.1	1,195.5	92.0	245.3	2,577.9	527.5
	2010		200.0	200.0	36.5	1,045.1	1,195.5	92.0	245.3	2,577.9	471.0
	2011		200.0	200.0	32.6	1,045.1	1,195.5	92 0	245.3	2,577.9	420.5
	2012		200.0	200.0	29.1	1,045.1	1,195.5	92.0	245.3	2,577.9	375.5
	2013		200 0	200 0	26.0	1,045.1	1,195.5	92.0	245.3	2,577 9	335 2
	2014		200.0	200.0	23.2	1,045.1	1,195.5	92.0	245.3	2,577.9	299.3
	2015		200.0	200 0	20.7	1,045.1	1,195.5	92.0	245.3	2,577.9	267.2
	2016		200.0	200.0	18.5	1,045.1	1,195.5	92.0	245.3	2,577.9	238.6
	TOTAL	8,433.9	4,000.0	12,433.9	9,199.6	19,846.4	23,837.1	1,811.5	4,593.3	50,088.3	16,129.3
		[1]				[2] [3] [4] [5]	[6]				

Assumptions:

[1] The economic costs of construction are estimated at 90% of actual costs= 9,371 million Won

[2] The effective subway speed = 26 km/h

[3] Number of travel days per year = 280

[4] Average one way distance travelled by car = 24.3 km

[5] Value of time = 2,058 won/hr

Discount rate = 12%

NPV = 6,929.6

B/C = 1.75

IRR = 23.00%

[6]

Vehicle Operating Cost		1997	1998	1999	2000	2001 - 2016
Speed	km/hr	14 2	13 1	12	11.1	10 2
VOC	won/veh-km	145 1	151 5	158 1	163 1	168 3
Average Occupancy P&R		1 47	1 78	1 77	1 42	1 80

Table 2: Economic Evaluation of Tongnae Intermodal Facility

	Year	Costs (million Won)				Benefits (million Won)									
		Cons-truction costs	O&M costs	Total costs	PV of total costs	Time savings by P&R users	VOC savings by P&R users	Transfer time savings by south of Chungnyol Brdg (W-E) users	Loss of time by non-sub-way users south side	Transfer time savings by north of Chungnyol B (E-W) users	Transfer time savings by south of Chungnyol B (S-E) users	Transfer time savings by pedestrians overpass	Transfer time savings by bicycle users	Total benefits	PV of benefits
[1]	1995	5,234		5,234	5,234									0	0
[1]	1996	5,201		5,201	4,643									0	0
	1997		231	231	184	534	981	89	-153	179	62	133	21	1,846	1,471
	1998		231	231	164	705	1,143	92	-152	186	65	138	21	2,198	1,564
	1999		231	231	147	848	1,210	96	-151	193	67	144	21	2,427	1,543
	2000		231	231	131	952	1,218	99	-150	201	70	149	21	2,560	1,452
	2001		231	231	117	984	1,125	103	-148	208	72	155	21	2,520	1,277
	2002		231	231	104	984	1,125	103	-148	208	72	155	21	2,520	1,140
	2003		231	231	93	984	1,125	103	-148	208	72	155	21	2,520	1,018
	2004		231	231	83	984	1,125	103	-148	208	72	155	21	2,520	909
	2005		231	231	74	984	1,125	103	-148	208	72	155	21	2,520	811
	2006		231	231	66	984	1,125	103	-148	208	72	155	21	2,520	724
	2007		231	231	59	984	1,125	103	-148	208	72	155	21	2,520	647
	2008		231	231	53	984	1,125	103	-148	208	72	155	21	2,520	578
	2009		231	231	47	984	1,125	103	-148	208	72	155	21	2,520	516
	2010		231	231	42	984	1,125	103	-148	208	72	155	21	2,520	460
	2011		231	231	38	984	1,125	103	-148	208	72	155	21	2,520	411
	2012		231	231	34	984	1,125	103	-148	208	72	155	21	2,520	367
	2013		231	231	30	984	1,125	103	-148	208	72	155	21	2,520	328
	2014		231	231	27	984	1,125	103	-148	208	72	155	21	2,520	293
	2015		231	231	24	984	1,125	103	-148	208	72	155	21	2,520	261
	2016		231	231	21	984	1,125	103	-148	208	72	155	21	2,520	233
	Total	10,435	4,620	15,055	11,418	18,781	22,558	2,023	-2,977	4,094	1,416	3,043	416	49,354	16,004
		[1]			[2]	[3] [4] [5]	[6]	[7]	[7]	[7]	[7]	[7]	[7]		

Assumptions:

[1] The economic cost are estimated at 90% of the actual financial actual cost of construction =11,594 million Won

[2] The effective subway speed = 26 km/h

[3] Number of travel days per year = 280

[4] Average one way distance travelled by car = 24 3 km

[5] Value of time = 2,058 won/hr

[6]

Vehicle Operating Cost		1997	1998	1999	2000	2001 - 2016
Speed	km/hr	14 2	13 1	12 0	11 1	10 2
VOC	won/veh-km	145 1	151 5	158 1	163.1	168 3
Average Occupancy P&R		1 82	2 03	2 06	2 01	2 21

Discount rate = 12%

NPV = 4,586

B/C= 1.40

IRR = 18.1%

Table 3: History of Metro Fare Increases

	1994	1995	1996	1997	1998	1999	2000	2001
Nominal fares 1 section	350	400	400	450	450	500	600	600
2 sections	400	450	450	500	500	600	700	700
Real fares: 1 section	375	400	385	420	400	453	550	543
2 sections	428	450	433	467	444	544	642	633

Annex 3.b

Part I FINANCIAL EVALUATION OF PUTA

Preface

1. The financial analysis, similar to the SAR, will be focused on the consolidated financial conditions of PUTA which constitutes over 85% of the total project cost. The methodology used in the ICR will also be similar to that employed in the SAR. At present, PUTA has two operating subway lines (Line 1 and Line 2) and one line (Line 3) under construction. Line 1 (32.5 km) was completed in June 1994; Line 2- the project line (phases I and II, 39.1km), was put into partial operation in June 1999 and completed in September 2002; and Line 3 (29.5 km) which is under construction, is scheduled for partial operation in December 2005 and completion in December 2007.

2. The financial evaluation of the project is comprised of two parts. ***Part I*** is the overall financial evaluation of PUTA and ***Part II*** is the calculation of the FIRR and NPV of Line 2 (the project line), including sensitivity analysis, probabilistic risk analysis and scenarios analysis. The financial cost of the project was calculated on the basis of the weighted average cost of the various sources of funds. The weighted average financial cost of the capital is estimated to be 5.14% (72.8% from the Bank at 5.0% and 27.2% from domestic funds at 5.5%).

PART I: FINANCIAL EVALUATION OF PUTA

3. PUTA was established in 1994. Invested by the Ministry of Construction and Transportation (MOT), this state owned company was formed for the construction and operation of PUTA. The evaluation will be focused on the consolidated financial statements of the company. The main revenue of the company is the fare income and the fare is strictly regulated by the Pusan City Government (PCG).

4. Based on the current practice, the major financial operation features of the company can be summarized below:

(a) A high debt company. MOT is the sole owner of the PUTA. The company needs a constant external cash injection each year to full fill its cash shortages which results mainly from operating losses, the capital investment and the financial obligations.

(b) The Rule of the PCG: Starting 1998, the PCG and MOT share equally the capital investment of the PUTA. The PCG does not own the PUTA but can decide the fare of the PUTA, as well as its key personnel appointments and the development plan.

(c) The Low Fare Policy: The PCG is adopting the low fare policy to the subway users. The current operating revenues of PUTA is barely be able to cover its operating expenses.

(d) The Debts Structure: Most of the PUTA's debts are inherited from the borrowings for the construction of Line 1. And, it is estimated that three quarters (75%) of the total debts are either short or medium terms (the maturities are 3-5 years). This borrowing structure generates the cash pressure on PUTA's daily operations.

The financial Objective and the Fare

5. The main purpose of the operating revenue is to meet the minimum financial requirements for operation, instead of maximizing the financial rate of return on the capital investment. The actual basic subway fare, during the project's implementation period (1994-2001), has increased from 350 Won to 600 Won (or average 8.0% pa). For the long-term fare growth forecast, it is assumed that the fare will grow by 6.0% pa.

Traffic

6. The actual passenger traffic growth from 1994 - 1997, compared with the SAR' forecast, was in the acceptable range. The variation of the actual traffic growth rate was less than 10% of the forecasted figures made at the time of the appraisal. The Asia economic crisis in 1997-98, in which Korea was one of countries that was hit the hardest in the region, caused the large decrease in traffic demand. In 1998, for example, the total traffic was 203.3 million, which is similar to the 1993 data (203.7 million), backwards by five years. The traffic then slowly grew back from 1998 to 2001, by about 7.1%. pa. The Crisis caused a lower traffic growth rate from 1994-2001 (3.6% pa), compared with 14.2% pa forecasted in the ICR. And the overall traffic volume in 2001 was only about half of the SAR's estimate.

PUTA: Traffic Comparison (million passenger)

	1994	1995	1996	1997	1998	1999	2000	2001	Growth pa (1994-2001)
The SAR (a)	208.74	230.22	232.77	241.39	335.42	441.47	446.38	528.91	--
Annual growth	2.5%	10.3%	1.1%	3.7%	39.0%	31.6%	1.1%	18.5%	14.2%
The ICR (actual) (b)	195.64	213.89	217.91	218.27	203.31	242.36	240.17	250.03	--
Annual growth	-4.1%	9.3%	1.9%	0.2%	-6.9%	19.2%	-0.9%%	4.1%	3.6%
(b) / (a)	93.7%	92.9%	93.6%	90.4%	60.6%	54.9%	53.8%	47 3%	--

7. In terms of the long term traffic forecast, the annual growth rate for the completed lines (Line 1 and Line 2) is expected to be 2% pa. It is expected that the opening of the Line 3 in 2006 will add 30.66 million passengers in that year, 118.63 million in 2007, 160.32 million in 2008 and grow 2% pa thereafter. In the SAR, construction of Line 3 was not taken into account for the traffic forecast. For comparison of the traffic forecast between the ICR and the SAR, Line 3 traffic has been excluded. Without the Line 3 traffic, the revised traffic growth rate between 1994 - 2007 (the latest available year in the SAR) is expected to be 4.1 % pa, compared with 9.4% pa assumed in the SAR. And, the revised traffic volume for 2002 - 2007 is about 50% less than the SAR's forecast. Summarized as follows:

PUTA: Traffic Comparison (million passenger)

	2002	2003	2004	2005	2006	2007	Growth pa (1994-2007)
The SAR (a)	600.29	620.08	624.40	645.00	649.51	670.94	--
Annual growth	13.5%	3.3%	0.7%	3.3%	0.7%	3.3%	9.4%
The ICR (b) /_1	282.50	304.78	310.87	317.09	323.43	329.90	--
Annual growth	13.0%	7.9%	2.0%	2.0%	2.0%	2.0%	4.1%
(b) / (a)	47.1%	49.2%	49 8%	49.2%	49.8%	49.2%	--

/_1: Exclude the Line 3 traffic.

Financial Project Cost

8. The actual total capital investment for the PUTA is Won 139,784 million, which is only 56.5% of the SAR's estimation (Won 247,616 million).

PUTA: Total Project Cost (Won million)

The SAR	The ICR	ICR/SAR
247,616	139,784	56.5%

Past and Present Financial Performance

9. The revised consolidated income statement for the PUTA is presented in Table 1. The salient points of the results for the last three years' actual performance (1999-2001), in comparison with the SAR, appear on the following table:

PUTA: Income Statement Comparison (1999-2001)

	1999		2000		2001	
	The ICR	The SAR	The ICR	The SAR	The ICR	The SAR
Passenger traffic ('000)	224,254	441,471	240,920	446,383	250,238	528,912
Total operating revenue (W million)	96,173	180,854	116,834	200,769	138,603	236,566
Total operating expenses (W million)	182,172	203,332	184,161	216,476	206,003	269,588
Other expenses (net) (W million)	(50,037)	239,873	39,745	281,543	30,742	313,382
Net cash surplus (loss) (W million)	(35,962)	(262,351)	(107,072)	(297,250)	(98,142)	(346,404)
Working Ratio	125 7%	74 2%	109.3%	72.1%	105 0%	67.6%
Operating Ratio	189.4%	112.4%	157 6%	107.8%	148.6%	114.0%
Rate of Return on Net Fixed Assets	-1.9%	-1.3%	-5.2%	-0 9%	-4.3%	-1 2%

10. All major financial ratios (working ratio, operating ratio and rate of return on net fixed assets) show a deteriorated situation which results mainly from the lower than the expected traffic volume and operating revenues. From 1999 - 2001, for an example, the actual traffic and revenue of PUTA constituted less than 60% of the SAR's estimates.

PUTA: Traffic and Revenue Comparison (1999 - 2001)

		1999	2000	2001
Passenger Traffic (million)	The ICR (a)	242 36	240.17	250.03
	The SAR (b)	441 47	446.38	528.91
	(a) / (b)	54.9%	53.8%	47.3%
Operating Revenue (W billion)	The ICR (c)	96.17	116.83	138.60
	The SAR (d)	180.85	200.77	236.57
	(c) / (d)	53.2%	58.2%	58.6%
Operating Gain (Loss) (W billion)	The ICR (e)	(35.96)	(107.07)	(98.14)
	The SAR (f)	(262.35)	(297.25)	(346.40)
	(e) / (f)	13.7%	36.0%	28.3%

11. Despite the lower traffic demand, the total operating loss of PUTA was in much better condition than the SAR' forecast. Based on the actual data, the total net cash loss for 1999–2001 constituted only 13.7%, 36.0% and 28.3%, respectively, of the forecasted amount in the SAR. The main reasons were: (a) the higher growth rate on the unit operating revenue, and (b) the lower unit operating expenses. This is explained as follows:

12. Unit Operating Revenue: From 1994 to 2001, the actual unit operating revenue grew from 347 Won / passenger to 555 Won / passenger or 6.9% pa. This growth rate is faster than 4.0% pa forecasted in the SAR. In 2001, the actual unit operating revenue was 23.9% higher than the SAR's forecast (554 Won / passenger *vs.* 447 Won / passenger).

PUTA: Unit Operating Revenue Comparison (Won/ passenger)

	1994	1995	1996	1997	1998	1999	2000	2001	Growth pa (1994-2001)
The SAR (a)	339	341	377	375	406	410	450	447	4.0%
The ICR (b)	346	374	416	441	431	397	487	555	6.9%
(b) / (a)	2.1%	9.7%	10.4%	17.7%	6.1%	-3.1%	8.2%	23.9%	--

13. Unit Operating Expenses: The total operating expenses were much less than expected. In the SAR, the unit operating expenses were assumed at very high starting figures, but maintained almost a constant figure from 1994-2001. The actual growth rate for the unit operating expenses was 9.2%. Despite the fast growth rate, the actual unit operating expenses are still lower than the SAR's forecast. In 2001, the actual unit operating expenses were 6.6% lower than the SAR's forecast.

PUTA: Unit Operating Expenses Comparison (Won/ passenger)

	1994	1995	1996	1997	1998	1999	2000	2001	Growth pa (1994-2001)
The SAR (c)	895	922	998	994	996	889	927	878	-0.3%
The ICR (d)	446	481	539	493	621	752	767	824	9.2%
(c) / (d)	100.7%	91.7%	85.2%	101.6%	60.4%	18.2%	20.9%	6.6%	--

14. Section 4.03 of the Project Agreement 1 states that, starting December 31 1995, total annual operating revenue of the PUTA should be equivalent to and not less than the total operating expenses. In the actuality, except for 1998, the PUTA has not met this requirement during 1995-2001. The low fare policy and the low traffic demand have not seriously affected the daily operations of the company because of the large government subsidies that have been injected to the company every year. In 2001, for example, the total amount of the government subsidies to the PUTA was Won 461.8 billion or 3.3 times the PUTA's total annual operating revenue. The actual subsidy level largely exceeded the SAR's projection of Won 132.2 billion or 56% of total operating revenue for 2001. In the long-term, without changing the current operating styles, PUTA can only survive if the large amount of the government subsidies continues to flow to the company every year. (Table 2: Sources and Applications of Funds).

15. Starting 1997, the total debt (long term plus current) of PUTA exceeded or was very close to its total assets. Further, the ratio of current liabilities (the maturities of less than one year) to the total debt has increased from 16.6% in 1995 to 30.4% in 2001. Although the equity was improved in 2001, it is expected that it will turn negative in 2002 and maintain the negative status almost throughout the project's life. The negative equity status makes the financial leverage of the company simply nonexistent, and it may not be able to relieve it's severe solvency problems until 2008 (current ratio, the soundness of liquidity which should be at least greater than 1.0). The detailed balance sheet is presented in Table 3 and summarized for 1999-2001 (actual) as follows:

PUTA: Balance Sheet (Won million)

	1999	2000	2001
ASSETS·			
Fixed assets (net value)	1,894,483	2,064,511	2,292,866
Current assets	108,750	77,819	57,535
Other assets	448,939	437,762	427,878
Total	2,452,172	2,580,092	2,778,279
LIABILITIES & EQUITY.			
Equity	(52,617)	(27,690)	13,634
Long-term debts	1,883,734	1,833,011	1,924,312
Current liabilities	621,055	774,771	840,333
Other liabilities	--	--	--
Total	2,452,172	2,580,092	2,778,279
Current ratio	**0.18**	**0.10**	**0.07**
Debt/ (debt + equity) ratio	**102/-2**	**101/-1**	**100/0**

/_1: In the SAR, there is no balance sheet statement.

Future Financial Performance

16. To forecast the future financial condition, the consolidated financial statements have been prepared (Tables 1, 2, and 3). The financial statements were prepared on the basis of the SAR's format and incorporated with the current practice. The operating expenses of PUTA can be categorized as: working cost (a. labor, b. material and supplies, c. power and d. others), and operating expenses (working cost + depreciation). All other expenses, e.g., non operating income and expenses, interest payments and others, are also included in the calculation of the profitability of PUTA. The major financial assumptions are in Table 4.

17. Based on it's current practice, the PUTA would not be able to balance its income statement over the life of the project. Due to the heavy government subsidies, PUTA will probably not have difficulty managing its cash flow. However, the company will not have any financial leverage over the project's life and will be constantly facing solvency problems until 2008 due to the poor profitability. In addition, the future financial performance of PUTA is determined by the improvement of the following three major factors.

18. Working Cost: Cutting working costs is one of the important steps to improve the profitability of the operation. In 2001, for an example, total unit working costs (582 Won / passenger) exceeded the total unit operation revenue (555 Won / passenger). This means, on average, that each passenger was receiving 27 Won of subsidy when they used the subway system (unit profits was estimated to be 145 Won / passenger in the SAR). Adding depreciation, the estimated total subsidies for each passenger would be 269 Won / passenger (unit subsidies was estimated to be 63 Won / passenger in the SAR). Further analysis of the total unit working costs shows that two thirds of the cost is for labor (386 Won / passenger). To reduce the labor and to improve the operating efficiency, one example is to use the machines to replace the current manual ticket sales in each subway station.

19. Traffic: Currently the system transports about 250 million passengers a year. Considering the city's 3.75 million residents, the average person only uses the system less than 6 times per month (or less than three round trips per person per month). This number is not very high and the system has large excess capacity to handle more passengers. Given the factors of (a) the quality railcar maintenance and the

services provided by the system, (b) the low fare policy, and (c) the upward trend of traffic demand over the last three years after the Asia economic crisis in 1997–1998, the PUTA should have more leverages to lure more passengers. One of the possible ways to increase the subway traffic would be to upgrade the feeder line services. Assign more local bus routes to connect with the subway stations to encourage the potential customers to use the system.

20. Debt: Reduction of the financial burdens of the company would lead the PUTA to better business practices and less financial dependency on the government. The current high debt status is not only ruining all the financial ratios but also draining off the cash reserves of the company. In the 2001 income statement, the total interest payments alone was 102.8% of the total operating revenue. This means that the total gross operating income of the company cannot meet the total interest payments in that year. The high portion of the short-term debt (paras 4 and 15) has been causing difficulties for the company in carrying out normal business decisions and the development plan. Debt reduction is one of the important factors to improve the future financial condition of the PUTA.

PART II: THE FINANCIAL EVALUATION OF THE PROJECT

Financial Internal Rate of Return (FIRR)

21. The calculation of the FIRR is focused on Line 2 construction (the project) only, and not for the entire PUTA. The low fare policy, as the government intended, produces a large financial impact on FIRR. It is estimated that Line 2 operations will not be profitable until 2006. The FIRR of the project is expected to be 0.7 percent. There are no FIRR and NPV calculations in the SAR. The results are summarized as below:

PUTA: FIRR and Net Present Value

FIRR (in %)	0.7
Net Present Value (Won billion, 5.14%)	-134.97

Sensitivity Analysis

22. The sensitivity analysis tested different scenarios on the bases of the change of some major parameters assumed in the analysis. The principal endogenous and exogenous parameters that could affect the project financial results are: traffic growth rate, fare growth rate, total working costs and changes in interest payments. The results show that: (a) changes in fare and working costs have the greatest impact on the financial evaluation, (b) there is a moderate impact on changes in traffic growth rate, and (c) the least impact is caused by changes in interest payments. The financial results summary by different scenarios is shown as follows:

PUTA: FINANCIAL SENSITIVITY ANALYSIS SUMMARY

		FIRR (in %)	NPV (Won billion, 5.14%)
Traffic Growth Rate:	3% pa	2.9	-77.43
	1% pa	-2.0	-185.02
Fare Growth Rate:	8% pa	8 9	169.88
	4% pa	-18.6	-372.27
Working Cost Growth Rate:	7% pa	-28.4	-453.69
	3% pa	7.9	109.35
Interest Payments	+15%	0.6	-138.02

Probabilistic Risk Analysis (Financial Simulation)

24. To determine the degree of uncertainty for the project, a probabilistic risk analysis using Monte Carlo techniques was carried out. In a Monte Carlo analysis, each uncertainty factor is allowed to vary at random between set limits and all uncertainty factors are allowed to change simultaneously. Monte Carlo simulation provides probability distributions of the potential outcomes of decisions. By analyzing these distributions, we can assess the risk associated with making various decisions (or probabilistic risk analysis). The product of the analysis is a judgment on the possible range of the decision variable, and on the likelihood of each value within this range.

25. For the project, four uncertain factors that may affect the result of financial evaluation have been identified: (a) traffic growth rate, (b) fare growth rate, (c) total working costs, and (d) interest payments. The result of financial probabilistic analysis reveals that the most likely FIRR on the project would be 0.3 percent, while the worst and the best FIRR would be -1.8 percent and 2.1 percent, respectively. The details of the FIRR and NPV are in Table 5 and summarized as follows:

PUTA: Summary of Financial Probabilistic Analysis

	Range of FIRR & NPV	Most Likely FRR &NPV	Std. Error of the Mean
FIRR (in %)	- 1.8% ~ 2.1%	0.3%	0.1%
NPV (Won billion, 5.14%)	- 194.11 ~ - 99.87	-147.02	2.77

Scenarios Analysis (Financial Alternative)

26. There are two special features of PUTA's accounting practice: (a) It is owned by MOT (the central government) but 50% of the construction costs are grants from the PCG (the local government), and (b) the PCG does not own PUTA, but can determine the fare. Three financial scenarios have been tested on the basis of these two features:

27. The first scenario is a complete decentralization of the PUTA from the central government (MOT) to the local government (PCG). Without subsidies from MOT, a fare increase is inevitable. An 8% annual fare increase (current assumption is 6% pa) would be able to shorten the number of losing years by half, from the entire project life of 20 years (2002-2022) to the first ten years (2002-2012) and there would be no cash shortage in 2002. The FIRR and NPV of the project would be expected to be 8.9% and Won 169.88 billion, respectively.

28. The second scenario is to convert part of the debt, particularly for the short and medium term debt,

to equity. This one time financial assistance can reduce financial obligations and help to restore financial leverage of the company. If 50% of debt is converted into equity, the PUTA would be able to balance its income statement in 2010. There would be no cash flow deficit over the entire project life. The solvency problems and the financial leverage would be restored in 2006 and 2007, respectively. The FIRR and NPV of the project would be expected at 0.9% and Won -124.79 billion, respectively.

29. The third scenario is to combine the first and second scenarios by increasing the fare growth rate of 8% pa and converting 50% of debt into equity. The PUTA would be able to balance its income statement in 2008 with no cash flow deficit for the entire project life, and the solvency problems along with the financial leverage would be restored before 2008. The FIRR and NPV of the project would be expected at 9.2% and Won 180.06 billion, respectively.

30. Comments: The first scenario (increasing the fare) meets the minimum financial requirement to operate the system. For the long-term financial viability, the fare must be able to exceed or become close to its working cost. The second scenario (reduce the debt) is to improve the financial borrowing structure of the company. Reduction of the debt will restore the company's financial leverage and liquidation capacity. The third scenario is the combination of the first and the second scenarios. It is the most desirable solution because it will enhance the profitability as well as the financial strength of the company. The FIRR and NPV of the project for the third scenario also show the best results for the company.

31. Recommendations: The current total operating revenue cannot cover its total operating expenses. The addition of heavy debt has put PUTA in a very difficult financial situation for its daily operations and long term development. Decentralization of the company to the local government will end the subsidies from the central government and motivate the PCG to adjust its low fare policy. For long term financial viability, the fare should reflect or lean towards the real operating cost of the system. In addition, converting 50% of the total debt into equity will fundamentally improve the financial structure of the company. It is estimated that the total debt of the PUTA, at end of 2001, was Won 2,764.6 billion (or about US$ 2,236.8 million). If the 50% debt reduction is shared equally between MOT and the PCG, it would mean a one time payment of US$ 559.2 million from each party. This is a small price to pay considering that the total subsidies (MOT and the PCG) to PUTA, in 2001 alone, was Won 461.8 billion (or about US$ 373.62 million).

Table 1: Income Statement – PUTA

(Won million, year ending

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
UNIT VOLUMES														
Passenger traffic ('000S)	195,640	213,799	218,347	218,307	203,430	224,254	240,920	250,238	282,499	304,775	310,871	317,088	354,090	448,524
Track (km)	32 5	32.5	32 5	32 5	32 5	54 9	54 9	62 9	71 6	71 6	71 6	71 6	89 9	101 1
Passenger ('000S)/ km	6,020	6,581	6,705	6,716	6,256	4,415	4,375	3,975	3,946	4,257	4,342	4,429	3,939	4,436
Operating Income/passenger	(99 7)	(106 1)	(123 3)	(52.4)	(190 4)	(354.8)	(280 3)	(269 6)	(280 8)	(296 5)	(299 0)	(299 0)	(300 8)	(216 6)
Operating Income (million)/ km	(600)	(698)	(827)	(352)	(1,191)	(1,566)	(1,226)	(1,072)	(1,108)	(1,262)	(1,298)	(1,324)	(1,185)	(961)
OPERATING REVENUES														
Passenger Fares	64,960	72,094	81,060	85,386	80,713	89,413	106,569	124,963	149,724	171,284	185,279	200,400	237,241	318,452
Other Revenue	2,835	7,986	9,624	10,850	6,833	6,760	10,265	13,640	16,385	18,591	20,207	21,879	25,849	34,536
Total operating revenue	67,795	80,080	90,684	96,236	87,546	96,173	116,834	138,603	166,109	189,875	205,486	222,279	263,090	352,988
OPERATING EXPENSES														
Labor	44,387	49,371	59,798	61,567	60,419	77,651	88,210	96,391	114,412	129,529	138,648	148,397	173,858	231,438
Materials & Supplies	2,689	4,711	5,065	7,304	12,879	16,305	10,385	13,624	16,102	18,287	19,585	20,928	24,432	32,294
Electric Power	5,493	5,941	6,132	7,412	8,936	12,656	13,715	15,610	18,362	20,725	22,072	23,782	27,973	37,227
Other Expenses & Claims	5,448	7,276	8,242	9,599	10,314	14,313	15,385	19,868	23,447	26,515	28,289	30,440	35,763	47,544
Subtotal working cost	58,017	67,299	79,237	85,882	92,548	120,925	127,695	145,493	172,323	195,056	208,594	223,547	262,026	348,503
Depreciation,														
Rolling Stock	9,447	13,765	16,311	10,294	12,135	9,874	10,718	12,691	14,623	17,038	17,970	18,709	21,514	20,327
Facilities & Equipment	19,832	21,713	22,010	11,489	21,569	51,373	45,748	47,819	58,490	68,153	71,880	74,836	86,055	81,307
Subtotal depreciation	29,279	35,478	38,321	21,783	33,704	61,247	56,466	60,510	73,113	85,191	89,850	93,545	107,569	101,634
Total operating expenses	87,296	102,777	117,558	107,665	126,252	182,172	184,161	206,003	245,436	280,247	298,444	317,092	369,595	450,137
OPERATING INCOME / (LOSS)	(19,501)	(22,697)	(26,874)	(11,429)	(38,706)	(85,999)	(67,327)	(67,400)	(79,327)	(90,372)	(92,958)	(94,813)	(106,505)	(97,149)
NON-OPERATING INCOME	12,479	26,281	12,667	12,136	54,531	13,677	5,654	6,878	7,345	8,229	8,704	9,196	10,623	13,904
NON-OPERATING EXPENSES														
Interest (net)	66,046	83,413	89,909	102,878	97,314	99,059	166,461	142,537	298,086	303,955	338,831	371,595	420,958	373,228
Others	49,837	25,012	45,484	57,132	5,955	6,902	29,370	18,655	19,215	19,791	20,385	20,996	21,626	22,275
Total non-operating expenses	115,883	108,425	135,393	160,010	103,269	105,961	195,831	161,192	317,301	323,746	359,216	392,591	442,584	395,503
EXTRAORDINARY INCOME	150	30	484	94	133,526	142,321	150,432	123,572	130,232	144,159	150,772	157,593	180,232	234,129
NET INCOME	(122,755)	(104,811)	(149,116)	(159,209)	46,082	(35,962)	(107,072)	(98,142)	(259,051)	(261,730)	(292,698)	(320,615)	(358,234)	(244,619)
INCOME TAX (29.7% after 2001)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
NET INCOME AFTER INCOME TAX	(122,755)	(104,811)	(149,116)	(159,209)	46,082	(35,962)	(107,072)	(98,142)	(259,051)	(261,730)	(292,698)	(320,615)	(358,234)	(244,619)
Working Ratio	**85.6%**	**84.0%**	**87.4%**	**89.2%**	**105.7%**	**125.7%**	**109.3%**	**105.0%**	**103.7%**	**102.7%**	**101.5%**	**100.6%**	**99.6%**	**98.7%**
Operating Ratio	**128.8%**	**128.3%**	**129.6%**	**111.9%**	**144.2%**	**189.4%**	**157.6%**	**148.6%**	**147.8%**	**147.6%**	**145.2%**	**142.7%**	**140.5%**	**127.5%**
Rate of Return on Net Fixed Assets	–	**-6.4%**	**-7.7%**	**-11.1%**	**2.2%**	**-1.9%**	**-5.2%**	**-4.3%**	**-13.8%**	**-12.3%**	**-12.3%**	**-12.4%**	**-13.4%**	**-9.0%**

Actual 1994-2001
Best estimate 2002
Forecast 2003 thereafter

Table 2: Sources And Applications of Funds - PUTA

(Won million, year ending December 31)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
SOURCES OF FUNDS														
Internal Sources:														
Net Income	(122,755)	(104,811)	(149,116)	(159,209)	46,082	(35,962)	(107,072)	(98,142)	(259,051)	(261,730)	(292,698)	(320,615)	(358,234)	(244,619)
Depreciation	29,279	35,478	38,321	21,783	33,704	61,247	56,466	60,510	73,113	85,191	89,850	93,545	107,569	101,634
Interest on Long-Term Debt	66,046	83,413	89,909	102,878	97,310	99,059	166,461	142,537	298,086	303,955	338,831	371,595	420,958	373,228
Others	26,842	(2,399)	35,132	47,254	4,344	19,913	41,658	18,142	19,825	23,363	26,267	27,677	29,172	38,373
Subtotal	(588)	11,681	14,246	12,706	181,440	144,257	157,513	123,047	131,973	150,779	162,250	172,202	199,465	268,616
Borrowings.														
IBRD	–	–	13,636	–	55,219	7,934	–	18,593	6,380	–	–	–	–	–
Project-Related Debt	104,010	319,073	71,883	100,178	365,000	310,000	420,000	420,000	551,900	241,733	282,254	252,648	936,959	830,159
Bonds	119,039	131,698	156,654	171,799	72,270	99,920	112,569	135,791	156,146	157,707	159,285	160,877	162,486	164,111
Misc Short-Term Debt	–	–	–	–	–	–	–	421,331	–	–	–	–	–	–
Subtotal	223,049	450,771	242,173	271,977	492,489	417,854	532,569	995,715	714,426	399,440	441,539	413,525	1,099,445	994,270
Government Contributions.														
National Government	156,000	202,500	291,100	291,800	264,091	270,550	347,010	330,500	400,542	424,819	442,382	456,516	412,970	344,959
City of Pusan	60,000	95,583	101,300	84,000	68,700	124,590	140,200	131,300	115,129	197,754	205,100	230,543	184,462	152,933
Subtotal	216,000	298,083	392,400	375,800	332,791	395,140	487,210	461,800	515,671	622,573	647,482	687,059	597,432	497,892
Total Sources of Funds	438,461	760,535	648,819	660,483	1,006,720	957,251	1,177,292	1,580,562	1,362,070	1,172,792	1,251,271	1,272,786	1,896,342	1,760,778
APPLICATIONS OF FUNDS														
Capital Expenditures	223,457	225,211	267,178	413,879	421,097	443,912	393,094	378,620	383,764	424,100	410,400	392,800	236,600	167,400
Debt Services.														
Interest Payment.														
On Pre '94 Debt	91,940	101,774	122,652	59,490	58,825	44,758	118,409	146,069	236,032	276,073	302,108	331,101	373,120	338,099
IBRD	–	–	918	725	3,500	4,007	3,509	3,643	4,151	3,700	3,227	2,728	2,205	1,658
Project-Related Debt	2,108	10,311	2,643	–	–	–	–	–	–	–	–	–	–	–
Bonds	3,366	3,951	4,700	42,663	34,989	50,294	44,543	53,150	58,106	2,443	33,794	38,074	45,928	33,728
Misc. Short-Term Debt	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	97,414	116,036	130,913	102,878	97,314	99,059	166,461	202,862	298,289	282,216	339,129	371,903	421,253	373,485
Principal Repayment														
On Pre '94 Debt	99,667	293,298	194,662	109,411	217,265	152,125	306,497	696,756	526,758	316,230	330,683	290,016	952,714	827,184
IBRD	–	–	–	–	–	–	8,883	10,162	8,904	9,355	9,828	10,327	10,850	11,397
Project-Related Debt	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Bonds	–	–	–	91,622	92,385	119,046	131,698	156,417	171,799	72,270	99,916	112,569	135,791	156,146
Misc. Short-Term Debt	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Subtotal	99,667	293,298	194,662	201,033	309,650	271,171	447,078	863,335	707,461	397,855	440,427	412,912	1,099,355	994,727
Total Debt Services	197,081	409,334	325,575	303,911	406,964	370,230	613,539	1,066,197	1,005,750	680,071	779,556	784,815	1,520,608	1,368,212
Change in Working Capital	11,421	11,034	41,143	30,884	202,288	160,530	190,372	144,801	(17,684)	(63,866)	(17,476)	(17,824)	(106,086)	(270,738)
Total Application of Funds	431,959	645,579	633,896	748,674	1,030,349	974,672	1,197,005	1,589,618	1,371,830	1,040,305	1,172,480	1,159,791	1,651,122	1,264,874
Net Funds Flow	6,502	114,956	14,923	(88,191)	(23,629)	(17,421)	(19,713)	(9,056)	(9,760)	132,487	78,791	112,995	245,220	495,904
Opening Balance	31,072	37,574	152,530	167,453	79,262	55,633	38,212	18,499	9,443	(317)	132,170	210,960	323,956	569,176
Closing Balance	37,574	152,530	167,453	79,262	55,633	38,212	18,499	9,443	(317)	132,170	210,960	323,956	569,176	1,065,080
Debt Service Coverage Ratio	**0.00**	**1.31**	**1.17**	**0.81**	**1.44**	**1.39**	**1.28**	**1.13**	**0.97**	**1.10**	**1.08**	**1.12**	**1.09**	**1.16**

Actual. 1994-2001
Best estimate 2002
Forecast: 2003 thereafter

Table 3: Balance Sheet - PUTA

(Won million, year ending December 31)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
ASSETS:													
Fixed Assets.													
At cost	1,599,568	1,843,550	1,327,166	1,981,214	1,688,436	1,801,998	1,969,843	2,276,854	2,616,134	2,944,454	3,258,694	3,447,974	3,581,894
Less Depreciation	50,992	89,313	111,096	144,800	206,047	262,513	323,023	396,136	481,327	571,177	664,722	772,291	873,925
Subtotal	1,650,560	1,932,863	1,438,262	2,126,014	1,894,483	2,064,511	2,292,866	1,880,718	2,134,807	2,373,277	2,593,972	2,675,683	2,707,969
Current Assets.													
Cash	152,530	167,453	79,262	55,633	38,212	18,499	9,443	(317)	132,170	210,960	323,956	569,176	1,065,080
Inventory	56,089	51,661	43,206	39,068	59,306	57,973	47,302	53,675	57,907	59,065	60,247	67,277	85,220
Receivable and others	20,495	62,066	52,363	20,761	11,232	1,347	790	847	914	933	951	1,062	1,346
Subtotal	229,114	281,180	174,831	115,462	108,750	77,819	57,535	54,205	190,991	270,958	385,154	637,515	1,151,646
Other Assets	7,108	2,070	185,902	1,837	448,939	437,762	427,878	480,248	518,118	528,481	539,050	601,954	762,490
Total Assets	1,886,782	2,216,113	1,798,995	2,243,313	2,452,172	2,580,092	2,778,279	2,415,171	2,843,916	3,172,716	3,518,176	3,915,152	4,622,105
LIABILITIES & EQUITY:													
Equity- State funds	53,577	296,835	(429,414)	(109,969)	(52,617)	(27,690)	13,634	(681,016)	(496,420)	(234,429)	42,892	34,322	(293,713)
Long-term Debts:													
Borrowings- Local currency	1,158,116	1,254,180	1,271,226	1,131,792	1,173,037	1,184,582	1,299,545	1,468,994	1,584,831	1,616,529	1,648,858	1,841,270	2,332,323
Borrowings- Foreign Currency	339,567	309,261	466,789	754,629	667,106	607,673	581,123	713,309	769,557	784,949	800,647	894,078	1,132,522
Accrued Severance Benefits	30,806	40,528	48,741	44,191	43,591	40,756	43,644	49,437	53,336	54,402	55,490	61,966	78,492
Subtotal	1,528,489	1,603,970	1,786,756	1,930,612	1,883,734	1,833,011	1,924,312	2,231,740	2,407,724	2,455,880	2,504,995	2,797,314	3,543,337
Current Liabilities:													
Short-term borrowings	100,446	110,396	213,796	189,043	109,918	-	168,169	169,499	182,865	186,523	190,253	212,454	269,114
Current Portion of Long-term Borrowings	86,179	90,570	101,444	82,580	338,481	608,108	540,441	564,998	609,550	621,742	634,176	708,181	897,047
Other Payable and Accrued Expenses	16,623	7,673	15,118	143,242	160,512	152,866	114,838	113,000	121,910	124,348	126,835	141,636	179,409
Others	101,468	106,669	111,295	7,805	12,144	13,797	16,885	16,950	18,287	18,652	19,025	21,245	26,911
Subtotal	304,716	315,308	441,653	422,670	621,055	774,771	840,333	864,447	932,612	951,265	970,289	1,083,516	1,372,481
Other Liabilities	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Liabilities & Equity	1,886,782	2,216,113	1,798,995	2,243,313	2,452,172	2,580,092	2,778,279	2,415,171	2,843,916	3,172,716	3,518,176	3,915,152	4,622,105
Current Ratios	**0.75**	**0.89**	**0.40**	**0.27**	**0.18**	**0.10**	**0.07**	**0.06**	**0.20**	**0.28**	**0.40**	**0.59**	**0.84**
Debt/ equity ratio	**97/3**	**87/13**	**124/-24**	**105/-5**	**102/-2**	**101/-1**	**100/0**	**128/-28**	**117/-17**	**107/-7**	**99/1**	**99/1**	**106/-6**

Actual. 1995-2001
Best estimate 2002
Forecast 2003 thereafter

Table 4: Pusan Urban Transit Authority
Assumptions for Financial Forecasts

1.	Passenger Traffic:	2% pa.	after completion
2.	Fare Rate:	555	Won/ passenger Increase 6.0% every year.
3.	Operating Cost:		Increase 5 % pa.
	Labor	386	Won/ passenger
	Materials & Supplies	54	Won/ passenger
	Electric Power	62	Won/ passenger
	Other Expenses & Claims	79	Won/ passenger
	Major Maintenance (/ 10 year)		
	Depreciation	30	years
4.	Income tax	29.7%	After 2001
5.	Borrowing.		
	The IBRD	5.0%	on 15 year maturities, LIBOR US$ based single currency including 5 years grace period.
	Others		Mostly are 3-5 years maturities and the current interest rate mostly is in the range of 5-6%.

Table 5: PUSAN URBAN TRANSPORT MANAGEMENT PROJECT
FIRR SIMULATION AND PROBABILISTIC RISK ANALYSIS - PUTA

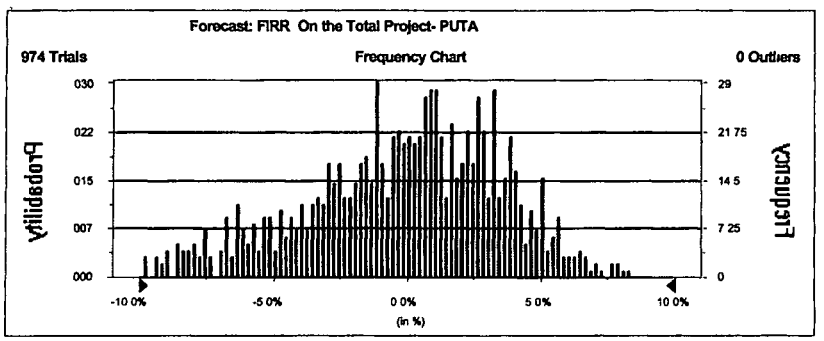
Summary.

Display Range is from -10 0% to 10 0% (in %)
Entire Range is from -9 7% to 8 3% (in %)
After 974 Trials, the Std. Error of the Mean is 0 1%

Statistics	Value
Trials	974
Mean	-0 1%
Median	0.3%
Mode	-6 3%
Standard Deviation	3 6%
Variance	0 1%
Skewness	-0 40
Kurtosis	2 70
Coeff of Variability	-32.45
Range Minimum	-9 7%
Range Maximum	8 3%
Range Width	18 0%
Mean Std Error	0 12%

Percentiles.

	Percentile	(in %)
	0%	-9 7%
	10%	-5.4%
Low Scenario	20%	-3 1%
	30%	-1.8%
Most Likely	40%	-0 7%
	50%	0 3%
High Scenario	60%	1 1%
	70%	2.1%
	80%	3 1%
	90%	4 1%
	100%	8 3%



Assumptions

Fare Growth Rate
Normal distribution with parameters.
Mean 100.0%
Standard Dev. 10 0%
Selected range is from -Infinity to +Infinity
Mean value in simulation was 99 8%

Traffic Growth Rate
Normal distribution with parameters:
Mean 100 0%
Standard Dev 15.0%
Selected range is from -Infinity to +Infinity
Mean value in simulation was 100 6%

Working Cost
Triangular distribution with parameters.
Minimum 90.0%
Likeliest 105.0%
Maximum 110 0%
Selected range is from 90 0% to 110 0%
Mean value in simulation was 101.6%

Interest Payments
Triangular distribution with parameters
Minimum 90.0%
Likeliest 100.0%
Maximum 110 0%
Selected range is from 90 0% to 110.0%
Mean value in simulation was 99.8%

Annex 4. Bank Inputs

(a) Missions:

Stage of Project Cycle	No. of Persons and Specialty (e.g. 2 Economists, 1 FMS, etc.)		Performance Rating	
Month/Year	Count	Specialty	Implementation Progress	Development Objective
Identification/Preparation				
September 5 - 19, 1992	*4*	Urban Transport Specialist, Senior Financial Analyst, 2 consultants		
May 23 - 28, 1993	*4*	Urban Transport Specialist, Senior Financial Analyst, 2 consultants		
August 30 - September 4, 1993	*5*	Urban Transport Specialist, Senior Financial Analyst, 3 consultants		
February 14 - 25, 1994	*4*	Urban Transport Specialist, Senior Financial Analyst, 2 consultants		
Appraisal/Negotiation				
May 25 - June 11, 1994	*4*	Urban Transport Specialist, Senior Legal Counsel, Senior Procurement Specialist, Senior Financial Analyst		
Supervision				
March 3 - 6, 1996	*1*	Principal Transport Specialist	HS	HS
December 4 - 9, 1996	*2*	Principal Transport Specialist, Financial Analyst	HS	HS
September 29 - October 2, 1997	*1*	Principal Transport Specialist	HS	HS
June 1998	*1*	Principal Transport Specialist	HS	HS
March 5 - 8, 1999	*2*	Principal Transport Specialist, Transport Engineer	S	S
November 3 - 5, 1999	*1*	Transport Engineer	S	S
April 2 - 4, 2001	*1*	Senior Transport Engineer	S	S
ICR				
April 22 - 26, 2002	*3*	Senior Engineer, Financial Analyst, Consultant	S	S
October - February 2003	*3*	Senior Transport Economist, Financial Analyst, Consultant	S	S

(b) Staff

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US$ ('000)
Identification/Preparation	101.9	328.4
Appraisal/Negotiation	54.4	90.1
Supervision	89.4	92 6
ICR	16 2	64.7
Total	261.5	574 6

Annex 5. Ratings for Achievement of Objectives/Outputs of Components

(H=High, SU=Substantial, M=Modest, N=Negligible, NA=Not Applicable)

	Rating
☐ *Macro policies*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☒ *Sector Policies*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☒ *Physical*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☒ *Financial*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☒ *Institutional Development*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☐ *Environmental*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
Social	
☐ *Poverty Reduction*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☐ *Gender*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☐ *Other (Please specify)*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☐ *Private sector development*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☐ *Public sector management*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*
☐ *Other (Please specify)*	○ *H* ○ *SU* ○ *M* ○ *N* ○ *NA*

Annex 6. Ratings of Bank and Borrower Performance

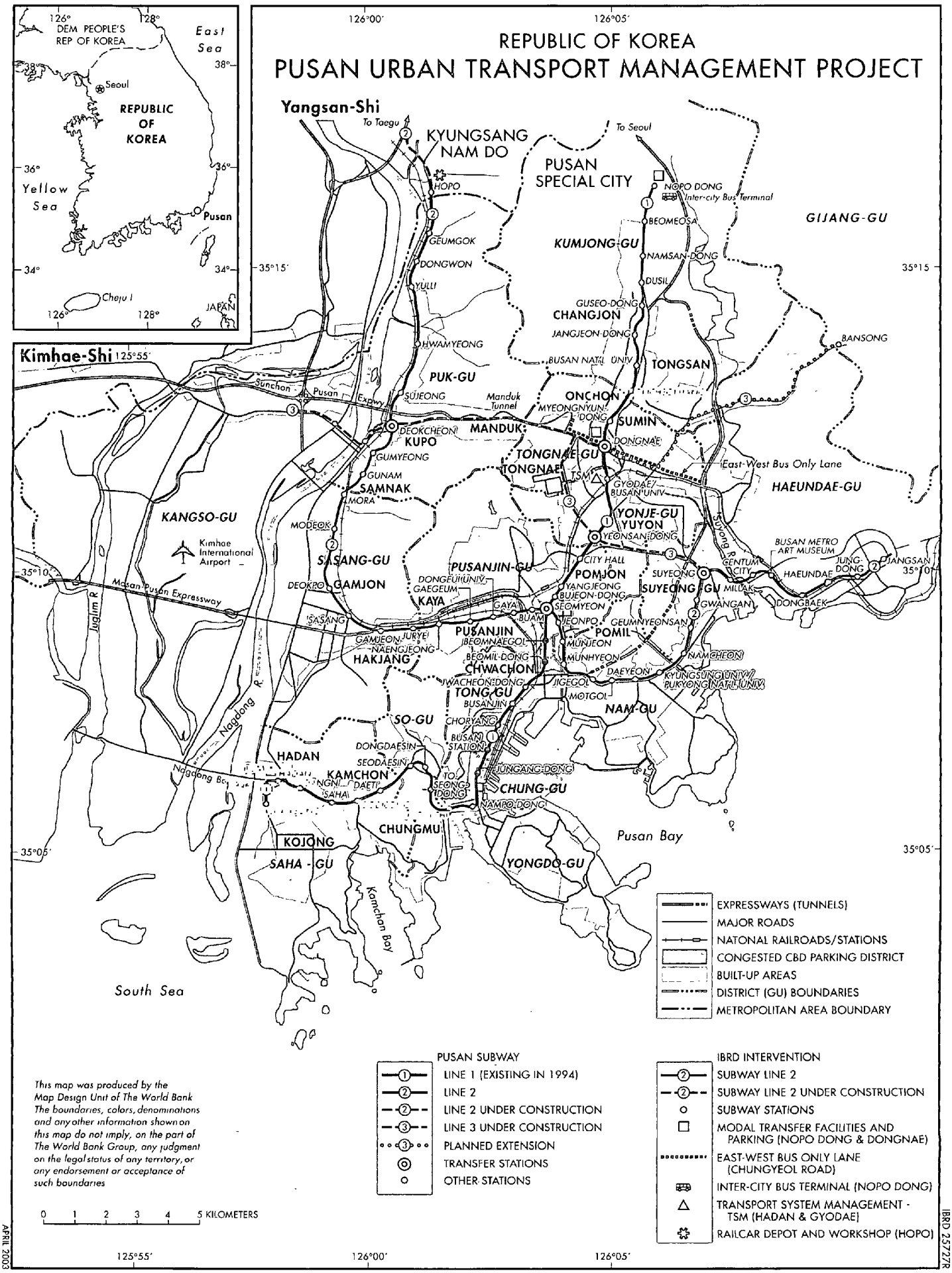
(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HU=Highly Unsatisfactory)

6 1 Bank performance	*Rating*
☒ *Lending*	○ *HS* ● *S* ○ *U* ○ *HU*
☒ *Supervision*	○ *HS* ● *S* ○ *U* ○ *HU*
☒ *Overall*	○ *HS* ● *S* ○ *U* ○ *HU*

6 2 Borrower performance	*Rating*
☒ *Preparation*	○ *HS* ● *S* ○ *U* ○ *HU*
☒ *Government implementation performance*	○ *HS* ● *S* ○ *U* ○ *HU*
☒ *Implementation agency performance*	○ *HS* ● *S* ○ *U* ○ *HU*
☒ *Overall*	○ *HS* ● *S* ○ *U* ○ *HU*

Annex 7. List of Supporting Documents

1. Study on Pusan's Fare Structure of Mass Transits, KOTI, January, 1997.
2. Pusan Urban Transportation Management Project Final Report, Transportation and Environmental Research Institute (TERI), November 1996.
3. Pusan Urban Subway Financing Study Final Report, Arthur Andersen (Korea Office), October 1996.
4. Korea Transport Sector, Resource Mobilization Challenges and Opportunities, The World Bank, April, 1995
5. Detailed Engineering Design of Pusan Modal Integration Facilities Final Summary Report, Yoo-Shin Engineering Corporation, February 1995.
6. Staff Appraisal Report, Pusan Urban Transport Management Project, November 1994
7. Economic Analysis of Modal Integration Facilities (Nopo and Tongnae), Technical Memo, Yoo-Shin Engineering Corporation, August, 1994.
8. Pusan Modal Integration and Congestion Management Study Yoo-Shin Engineering Corporation, January, 1993.
9. East West Highway Plan, Pusan City Government, July 1992.
10. Basic Plan for the Establishment of East-West Urban Rail Transit in Pusan City, Korea Transport Institute (KOTI), October, 1990.


REPUBLIC OF KOREA
PUSAN URBAN TRANSPORT MANAGEMENT PROJECT
DEM PEOPLE'S REP OF KOREA
East Sea
Seoul
REPUBLIC OF KOREA
Yellow Sea
Pusan
Cheju I
JAPAN
Yangsan-Shi
To Taegu
To Seoul
KYUNGSANG NAM DO
PUSAN SPECIAL CITY
HOPO
NOPO DONG
Inter-city Bus Terminal
BEOMEOSA
GIJANG-GU
KUMJONG-GU
GEUMGOK
DONGWON
NAMSAN-DONG
YULLI
DUSIL
GUSEO-DONG
CHANGJON
JANGJEON-DONG
BANSONG
HWAMYEONG
BUSAN NAT'L UNIV
TONGSAN
Kimhae-Shi
PUK-GU
Sunchon
Pusan Expwy
SUJEONG
Manduk Tunnel
ONCHON
MYEONGNYUN-DONG
SUMIN
DEOKCHEON
MANDUK
KUPO
DONGNAE
GUMYEONG
TONGNAE-GU
TONGNAE
East-West Bus Only Lane
GUNAM
SAMNAK
MORA
TSM
GYODAE/BUSAN UNIV
HAEUNDAE-GU
KANGSO-GU
YONJE-GU
YUYON
MODEOK
YEONSAN-DONG
Kimhae International Airport
BUSAN METRO ART MUSEUM
SASANG-GU
PUSANJIN-GU
CITY HALL
POMJON
SUYEONG
GENTUM CITY
JUNG-DONG
JANGSAN
DEOKPO
GAMJON
DONGEUI UNIV.
GAEGEUM
YANGJEONG
BUJEON-DONG
SUYEONG-GU
MILLAK
HAEUNDAE
KAYA
GAYA
SEOMYEON
GWANGAN
DONGBAEK
Masan-Puson Expressway
Jujim R
SASANG
BUAM
JEONPO
GEUMNYEONSAN
PUSANJIN
POMIL
GAMEON
JURYE
NAENGJEONG
JIBEOMNAEGOL
MUNJEON
HAKJANG
BEOMIL-DONG
MUNHYEON
NAMCHEON
CHWACHON
DAEYEON
KYUNGSUNG UNIV./PUKYONG NAT'L UNIV.
JWACHEON-DONG
JIGEGOL
TONG-GU
MOTGOL
BUSANJIN
NAM-GU
SO-GU
CHORYANG
Nagdong R
BUSAN STATION
DONGDAESIN
SEODAESIN
HADAN
JUNGANG-DONG
Nagdong Bay
KAMCHON
NGNI
DAETI
SAHA
TO/SEONG-DONG
CHUNG-GU
NAMPO-DONG
CHUNGMU
Pusan Bay
KOJONG
SAHA-GU
YONGDO-GU
Kamchon Bay
South Sea
125°55'
126°00'
126°05'
35°15'
35°10'
35°05'
EXPRESSWAYS (TUNNELS)
MAJOR ROADS
NATONAL RAILROADS/STATIONS
CONGESTED CBD PARKING DISTRICT
BUILT-UP AREAS
DISTRICT (GU) BOUNDARIES
METROPOLITAN AREA BOUNDARY
PUSAN SUBWAY
LINE 1 (EXISTING IN 1994)
LINE 2
LINE 2 UNDER CONSTRUCTION
LINE 3 UNDER CONSTRUCTION
PLANNED EXTENSION
TRANSFER STATIONS
OTHER STATIONS
IBRD INTERVENTION
SUBWAY LINE 2
SUBWAY LINE 2 UNDER CONSTRUCTION
SUBWAY STATIONS
MODAL TRANSFER FACILITIES AND PARKING (NOPO DONG & DONGNAE)
EAST-WEST BUS ONLY LANE (CHUNGYEOL ROAD)
INTER-CITY BUS TERMINAL (NOPO DONG)
TRANSPORT SYSTEM MANAGEMENT - TSM (HADAN & GYODAE)
RAILCAR DEPOT AND WORKSHOP (HOPO)
This map was produced by the Map Design Unit of The World Bank The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries
0 1 2 3 4 5 KILOMETERS
APRIL 2003
IBRD 25727R

Report No.: 24702
Type: ICR